TABLE 1. CHEMICALS NOMINATED TO THE NTP FOR IN-DEPTH TOXICOLOGICAL EVALUATION FOR CARCINOGENESIS TESTING IN FISCAL YEARS 1988-1998

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Acesulfame potassium 55589-62-3	Center for Science in the Public Interest 1996	The FDA is considering a food additive petition for the use of acesulfame potassium as an artificial sweetener in nonalcoholic beverages. Millions of Americans who drink diet beverages will be exposed to this chemical. Tests carried out to date do not give reasonable assurance that the chemical is safe and the poor tests suggest that it may be carcinogenic. The FDA has not required the manufacturer to carry out high-quality tests before the agency considers approving its use in nonalcoholic beverages. Since the safety of acesulfame potassium must be assured before marketing is approved, the nominator is requesting that NTP conduct the appropriate long-term tests.	This chemical is under FDA jurisdiction - not appropriate for NTP to test.
Acetaminophen (4-Hydroxyacetanilide) 103-90-2	Private Individual 1994	See Local Anesthetic compounds	See Local Anesthetic Compounds.
Acetic acid 64-19-7	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Acetochlor 34256-82-1	NIEHS 1992	Acetochlor was nominated by the NIEHS as part of the U.S.-Hungary cooperative effort to study the effects of agricultural chemicals in the U.S. and Europe. The compound was nominated as a high priority for NTP's carcinogenicity testing. The nomination was based on the chemical's wide use as a herbicide and its potential for large scale human exposure. Exposure may be direct through occupational use or indirect, through environmental contact or food intake. Little information is available on the carcinogenicity of this herbicide. However, alachlor, a structurally-related chemical, was found to be carcinogenic in experimental animals.	In discussions between NTP staff and representatives of Hungary, it was decided that acetochlor had been well-studied and that simazine could be substituted for acetachlor as an agent to study. Simazine was of common interest to both parties and Hungary has completed a rat study. Simazine (122-34-9) - Subchronic dosed-feed completed - Chronic dosed-feed on test
Acetyl tributyl citrate (ATBC) 77-90-7	NCI 1991	Widespread use; potential for increased use; reports of food contamination from food polyvinyl chloride (PVC) "cling-film" wrap and with plasticizers from other packaging materials; lack of toxicity data.	- Withdrawn by nominator
2-Acetylpyridine 1122-62-9	NCI 1997	2-Acetylpyridine's nomination is based on: 1) potential for occupational or environmental exposures as a result of production or processing; 2) potential for general and consumer population exposures based on its natural occurrence as a flavor/aroma constituent and wide use as a component in processed food products and in aroma therapy; 3) lack of genetic and chronic toxicity test data; and 4) suspicion of carcinogenicity based on pyridyl ketone structure.	Based on low production of 2-Acetylpyridine (10,000 pounds annually), NTP will recommend 2-acetylpyridine be withdrawn as a candidate for NTP study.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
C.I. Acid Brown 83 13011-68-2	Private Individual 1990	- Used to finish leather goods used in clothing and furniture - Potential for human exposure - Found to be a source of mutagens after leather coloring processes were carried out	- Nominated for prechronic carcinogenicity; under review
C.I. Acid Red 52 3520-42-1	NCI 1989	See Dyes	See Dyes
Adiponitrile 111-69-3	NIEHS 1995	High production volume chemical	No testing. The toxicity of adiponitrile is essentially that of cyanide. Since the toxicity of cyanide is well known and the NTP has studied other nitriles and the toxicity of this class of chemicals is well documented, it was not recommended for testing. - Negative in *Salmonella*
Alcohol Drug Combinations	Private Individual 1994	Intolerance of alcohol when combined with certain drugs	No response from nominator when requested to identify specific drugs used in combination with alcohol. Nomination no longer under consideration.
Alkoxy Silanes Class	Private Individual 1994	Lack of quantitative carcinogenicity data by the oral route and little attention to reproductive and immunotoxic effects. Increased use in many schools and public buildings to remediate conditions related to microbiological contamination; inadequate testing; potentially toxic pesticides being used in schools.	Refer to the Interagency Testing Committee (ITC)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Long-Chain Alkylbenzenes	State of Connecticut 1995	The molecules of alkylbenzenes of chain lengths of C-9 or greater are of concern because of alkylbenzene spills from subaqueous power cables. Alkylbenzenes occur as a mixture of 9-15 carbon chain lengths and are used as feedstock in the production of linear subaqueous power alkylbenzene sulfonate-based detergents, in dielectric fluids, and other industrial/commercial applications. Believed to be high production chemicals. Literature suggests promotional effect as active promoters in skin painting studies. Common marine pollutants which have been shown to bioaccumulate in shellfish, which poses potential human health concern. Lack of chronic toxicity data.	In review
Allyl acetate/Allyl alcohol	NCI 1993	Allyl acetate and allyl alcohol were nominated as a pair because of potential for high human exposure, high production volume, and lack of information. Allyl alcohol was nominated with allyl acetate because of metabolism considerations. Both compounds are positive in numerous mutagenicity assays.	Allyl acetate (591-87-7): - Gavage prechronic study completed - Metabolism on test - Negative in micronucleus assay - Positive in *Salmonella* Allyl alcohol (107-18-6): - Gavage prechronic study completed - Negative in micronucleus assay - Negative in *Salmonella*
Allyl bromide 106-95-6	NCI 1995	Widespread use leading to human exposure associated with its manufacture and use; persistent as an environmental pollutant; a suspicion of carcinogenicity; alkylating agent; positive genotoxicity test results.	- Repeated dose gavage and skin paint on test - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Aluminum sulfate 7783-20-2	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
3-Amino-5-mercapto-1,2,4-triazole 16691-43-3	NIEHS 1997	High production and inadequate or no toxicological studies	Deferred for more information on use, production, and human exposure patterns
Ammonium sulfate 10043-01-3	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
tertiary-Amyl methyl ether (TAME) 994-05-8		See Fuel additives	See Fuel additives
Androstenedione 63-05-8	NCI 1998	Androstenedione is nominated for study because of its potential for abuse by athletes and bodybuilders as a steroidal precursor to testosterone. It is being used by young adults at very high doses. Little scientific data is available on the chronic toxicity of this substance. Androstenedione is converted to estradiol through a P450 enzyme, aromatase. Several compounds structurally related to androstenedione inhibit aromatase, and are used to treat estrogen-dependent breast cancer in postmenopausal women.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Annatto 1393-63-1	NCI 1998	The nomination of bixin is based on the high production volume and widespread exposure of the population to annatto, one of the most highly consumed colorants in the US food supply. Bixin is the ingredient that contributes this color. Despite annatto's status as an unregulated color additive, little is known about the toxicity of bixin or norbixin which are concentrated in annatto extracts and oils. A few short-term tests for genotoxicity of annatto have been described as positive.	Deferred pending results of industry testing
Antimony trioxide 1309-64-4	State of California EPA (OEHHA) 1995	A component in facility chemical emissions lack of acute exposure data.	No testing - other study data exists - lack of funding to conduct a repeat study or to fill data gaps
Antiperspirants	Private Individual 1994	Nominator requests that a study be done to investigate the possible connection between the use of antiperspirants and the increase in incidence of breast cancer in women. Antiperspirants were not in use approximately 30 years ago; deodorants were used. Current statistics indicate that the incidence of breast cancer has been rising at a rate of 3% a year for the past 20 years.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Arsenic 7440-38-2	Private Individual 1993	Arsenic has been long recognized as being carcinogenic to humans. Several attempts--largely unsuccessful-- have been made to determine carcinogenicity in laboratory animals. A carcinogenesis study using the typical NCI/NTP protocol has yet to be accomplished. According to IARC, there is "limited evidence of carcinogenicity" in experimental animals. Because the evidence is not "sufficient", arsenic is considered to be the only chemical declared carcinogenic for humans without having unequivocal supporting evidence in animals. Arsenic causes skin and lung cancer in humans, and in several other suspected target sites: liver, hematopoietic system, gastrointestinal tract, kidney.	Arsenic (7440-38-2): Arsenic trioxide was selected as the representative chemical to test. Arsenic trioxide (1327-53-3): - Selected for carcinogenicity/toxicity testing - Neurotoxicity assessment completed
Arsenic trioxide 1327-53-3	Private Individual 1993 NIEHS 1994	Arsenic trioxide is listed by IARC as a Group 1 human carcinogen. It was nominated for carcinogenicity studies in F344 rats and B6C3F1 mice to further validate the NTP animal models and to strengthen the predictivity value of animal studies for assessment of human risk. Arsenic trioxide is used primarily in the manufacture of arsenical pesticides; however, it is also used in the manufacture of glassware and pharmaceuticals. The evidence for carcinogenicity of arsenic compounds in animals is inadequate, while there is sufficient evidence that inorganic arsenic compounds are carcinogenic to the skin and lungs of humans.	Deferred at this time - Neurotoxicity assessment completed
Articaine 23964-58-1	Private Individual 1994	See Local Anesthetic compounds.	See Local Anesthetic compounds

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Asbestos Fibers	Private Individual 1994	Lack of adequate inhalation studies on asbestos fibers	Selected for carcinogenicty/toxicity studies
Aspartame 228309-47-0	Private Individual 1991	Exposure to Aspartame has increased exponentially. Found in almost everything	- Neurotoxicology assessment, completed - No testing pending outcome of IARC review
Asphalt Fumes 8052-42-4	State of California-EPA 1994 NIOSH 1997	Lack of animal data via the inhalation route; no assessment of oncogenic risk; suggestive epidemiologic data and documented worker exposures NIOSH believes that asphalt fumes should be considered for toxicological assessments by the NTP because of the numbers of workers potentially exposed, the severity and scope of the potential effects, and because of unresolved questions regarding the effects of exposure.	Selected for carcinogenicty/toxicity studies; in addition immunotoxicity, lung irritation and function tests will be performed and biomarkers of exposure will be investigated. In review
Atrazine 1912-24-9	Private Individual 1991 NIEHS 1994	Wide use as pre-emergent herbicide on corn in the Midwest, eventually ending up in groundwater. Other studies have indicated tumor induction in mice from this compound. See Pesticides and Kids	Further testing deferred pending review and assessment of industry and other studies for adequacy. - Immunotoxicity, completed - Negative in *Salmonella* See Pesticides and Kids
3′-Azido-3′-deoxythimidine (AZT) 30516-87-1	NCI 1990	- Primary drug used to treat AIDS and HIV positive patients - Concern over the chronic toxicity effects of the drug to humans	- Prechronic studies completed - Chronic studies peer reviewed 12/96 (TR-469) progress (also in combination with interferon AD) - Positive in *Salmonella* and micronucleus assays - Negative for CA and positive for SCE in CHO cells *in vitro* - Dominant lethal male/female completed - Immunotoxicity report in preparation - Continuous breeding during test

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Benlate DF with Flusilazole and Chlorothalonil	State of Florida, Dept. of Health & Rehab Svstem 1995	Health complaints related to use of and residual contamination; large number of agricultural workers exposed; little is known about the toxicology of benlate in combination with suspected contaminants, flusilazole and chlorothalonil	In review. Per communication with EPA, Benomyl & Benlate DF are regulated under FIFRA; benomyl is classified as a probable carcinogen and testing has been completed. Benlate DF has not been studied by EPA and there are no plans to study it since its formulation is 75% benomyl & 25% inert ingredients. Chlorothalonil (1897-45-6): - Carcinogenicity dosed-feed technical report published (TR-41 reports CE, MR FR; NE, MM FM) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila*; - Positive in mouse lymphoma - Negative in *Salmonella* Benomyl (17804-35-2) - Mechanisms completed - Negative in *Salmonella*
Benomyl 17804-35-2	State of Florida, Dept. of Health & Rehab Svstem 1995	See Benlate DF with flusilazole and chlorothalonil	See Benlate DF with flusilazole and chlorothalonil

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bentonite 1302-78-9	NIOSH 1998	Bentonite was nominated for chronic inhalation studies to determine its potential to cause fibrotic lung disease. Reports note a relatively high incidence of fibrotic lung disease in workers exposed to bentonite. This elevated incidence rate has been ascribed to silica, which is present in varying degrees in bentonite. However, there is some evidence that bentonite itself can cause pneumoconiosis. Bentonite has a high potential for occupational exposure, and is currently not regulated in the workplace.	In review
Benzene 71-43-2	Private Individual 1991	Large volume chemicals to which the human population received relentless and uninformed exposures. Because most chemicals in commerce have not been evaluated for biological or toxicological effects (NAS, 1984), several chemicals with extremely large production amounts and immense numbers of people being exposed should be evaluated for both short-term and long-term potential adverse effects. Continuing interest to public health as well as to mechanisms. (Part of a priority list of chemicals compiled by DTRT/NIEHS).	Withdrawn by nominator for further testing consideration. - Final report of gavage carcinogenicity studies published (TR-289 reports CE, MR FR MM FM); - Chemical disposition completed; - Human metabolism chemical disposition completed; - Metabolism completed; - Neurotoxicology Assessment, Completed; - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells; - Negative for sex-linked recessive lethal mutations in *Drosophila*; - Negative in Mouse Lymphoma; - Selected for Micronucleus assay; - Negative in another Micronucleus assay; - Negative in *Salmonella*; - Neurotox completed - Total reproductive capacity completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Benzo[*a*]pyrene [B(a)P] 50-32-8	Department of Health Services, Health and Welfare Agency, State of California 1989	- Environmental pollutant as a result of the incomplete combustion of carbon products - High human exposure - Sufficient dose-response data needed for low-dose extrapolation to establish health based exposure criteria for humans environmentally exposed to B(a)P	Nominated for carcinogenicity; under review - Positive in *Salmonella* in two independent tests and one non-standard protocol - Positive male/female in mouse lymphoma - Positive for chromosome aberrations - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations and reciprocal translocation in *Drosophila* - Positive for sister chromatid exchanges - Positive dominant lethal females
Benzocaine 94-09-7	Private Individual 1994	See Local Anesthetic compounds	See Local Anesthetic compounds
Benzophenone 119-61-9	NIEHS 1988	- Worker and consumer exposure - Lack of chronic toxicity data	- Subchronic dosed-feed studies in progress - Negative in *Salmonella* - Negative in micronucleus - Teratology pilot studies completed - Teratology pilot studies selected - Teratology studies completed - Teratology studies on test - Teratology studies selected - Toxicokinetics completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Benzothiazole 95-16-9	NCI 1997	Benzothiazole's nomination is based on its: 1) potential for human exposure from its presence in foods and beverages, and as an environmental contaminant; 2) lack of chronic toxicity data; 3) lack of information about the benzothiazole moiety, which is present in many common products. Benzothiazole may leach from rubber stoppers into parenteral solutions. Through weathering of an antioxidant from tires, road dust and street runoff, contribute additional potential for exposure.	Deferred - uncertain human exposure
Benzoyl chloride 98-88-4	NCI 1990	- Previously nominated as a result of a study of potential air pollutants - Potential for significant human exposure - Use as an acylating agent in many commercial processes - Suspicion of carcinogenicity as an acylating agent	- Previously selected for general toxicology study but deferred because of budgetary considerations - Inhalation study withdrawn because of experimental difficulties - Renominated for 2-stage initiation/promotion studies by intratracheal or implantation route; NCI suggested that appropriate vehicle (e.g., corn oil) be used. Under review for further studies.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Benzyl chloride 100-44-7	State of California EPA (OEHHA) 1995	A component of facility chemical emissions; lack of acute exposure data.	No additional testing. Lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. No resources to conduct acute studies. - Chronic gavage bioassay reported in paper (W. Lijinsky (1986). Chronic Bioassay of Benzyl Chloride in F344 Rats and (C57BL/6JXBALB/C) F1 Mice. J. Nat Cancer Inst 76, No. 6:1231-1235) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in mouse lymphoma - Weakly positive in *Salmonella* in two independent tests
Benzyltrimethylammonium chloride 56-93-9	NIEHS 1988	- High production volume - Worker exposure - Lack of chronic toxicity data	- Subchronic gavage & topical studies completed - Chemical disposition completed - Metabolism completed - Toxicokinetics completed - Negative in *Salmonella* - Positive in micronucleus assay
Berberine 2086-83-1	NIEHS 1998	The nomination of goldenseal and two of its constituent alkaloids is based on the potential for human exposure and the lack of chronic or carcinogenicity data.	Selected
Berberine chloride dihydrate 5956-60-5	NIEHS 1998	The nomination of goldenseal and two of its constituent alkaloids is based on the potential for human exposure and the lack of chronic or carcinogenicity data.	Selected

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bis(tri-n-butyltin) oxide 56-35-9	NCI 1988	- High and increasing production volume - Potential for human exposure - Detected in fresh water - Associated with adrenal and pituitary tumors in Wistar rats - Lack of adequate chronic testing	- Negative in *Salmonella* - NTP Chemical Evaluation Committee (CEC) recommended deferral pending retrieval of results from mouse studies in progress
Bisacodyl 603-50-9	NIEHS 1996	This chemical is structurally related to phenolphthalein, which is currently being used in over-the-counter laxatives.	In review
Bisphenol S 80-09-1	NCI 1994	Bisphenol S (SDP) is increasing used in a variety of processes, especially as a chemical intermediate and monomer in the manufacture of plastics and resins.	Withdrawn by nominator - no need to test.
Bisphenol A diglycidyl ether 1675-54-3	NIEHS 1988 Private Individual 1998	- Worker exposure Positive in *Salmonella* and chromosomal aberrations studies Available carcinogenicity studies (skin-painting) were equivocal - The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	In review - Selected by NTP Executive Committee for testing - Referred to EPA for industry testing under TSCA Section 4(e) rule - *in vitro* cytogenetics: - Positive in *Salmonella* - Positive for chromosomal aberrations (CA) and sister chromatid exchanges (SCE) in Chinese hamster ovary (CHO) cells *in vitro*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bixin 6983-79-5	NCI 1998	The nomination of bixin is based on the high production volume and widespread exposure of the population to annatto, one of the most highly consumed colorants in the US food supply. Bixin is the ingredient that contributes this color. Despite annatto's status as an unregulated color additive, little is known about the toxicity of bixin or norbixin which are concentrated in annatto extracts and oils. A few short-term tests for genotoxicity of annatto have been described as positive.	Selected
Brominated Chemicals	NIEHS 1995	Most brominated chemicals evaluated to-date by the NTP were carcinogenic in rodents. The mechanisms of carcinogenesis are unknown. Three of the nominated brominated chemicals have high production volumes and were identified as hazardous substances. Five of the brominated chemicals were identified as pesticides that are regulated by the EPA.	Tetrabromophthalic anhydride (632-79-1): In review - Negative in *Salmonella* 2-Bromo-2-nitro-1,3-propanediol (52-51-7): - Negative in *Salmonella* No testing - no significant toxicity effects observed in available studies; chemical not expected to have toxic effects at concentrations used Bromochloromethane (74-97-5): In review - Positive in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Brominated Chemicals (Continued)			2,4,6-Tribromophenol (118-79-6): - Negative in *Salmonella* NTP testing deferred pending receipt of information. ITC approved the NTP recommendation of placing 2,4,6-TBP on the Priority Testing List under TSCA, Section 4e. Bromoacetic acid (79-08-3): In review - Positive in *Salmonella* Tribromosalan (87-10-5): In review - Negative in *Salmonella* Bromoxynil octanoate (1689-99-2): In review 1,2-Dibromo-2,4-dicyanobutane (35691-65-7): - Repeated dose gavage and skin pain on test; - Metabolism completed; - Negative in *Salmonella* Consider for carcinogenicity after reviewing metabolism data. EPA is going to revisit the potential use of this chemical as a fungicide and make sure that it is not being used for this purpose.
2-Bromo-2-nitro-1,3-propanediol 52-51-7	Private Individual 1988 NIEHS 1995	See Brominated chemicals - Used in wet baby wipes - Human exposure - Suspicion of toxicity based on structural considerations	See Brominated chemicals - Negative in *Salmonella* - Not recommended for testing by CEC and NTP Board of Scientific Counselors (BSC)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bromoacetic acid 79-08-3	American Water Works Association Research Federation 1991 NIEHS 1995 EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs See Brominated chemicals	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) See Brominated chemicals
Bromochloroacetic acid 5589-96-8	EPA (Office of Water) 1995 EPA 1997	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBPs, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) To be tested under the Water Disinfection By-products initiative. -Positive in *Salmonella* -Reproductive/Developmental & general toxicity study completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bromochloroacetonitrile 83463-62-1	American Water Works Association Research Federation 1991	See Water Disinfection By-Products	See Water Disinfection By-Products
Bromochloromethane 74-97-5	NIEHS 1995	See Brominated chemicals	See Brominated chemicals
Bromodichloroacetic acid 71133-14-7	American Water Works Association Research Federation 1991 EPA (Office of Water) 1995 EPA 1997	See Water Disinfection By-Products See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBP's, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	See Water Disinfection By-Products Selected - In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Bromodichloromethane 75-27-4	EPA (Office of Water) 1995 EPA 1997	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBPs, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) Selected for testing under the Water Disinfection By-products initiative via water, dermal and gavage routes and in the Transgenic Model Evaluation initiative by the gavage route. -Carcinogenicity gavage technical report published; TR-321 reports CE, CE, CE, CE in rats and mice) -Negative in *Salmonella* -Positive in mouse lymphoma -*In vitro* cytogenetics: negative (chromosome aberrations); inconclusive (sister chromatid exchanges) -Micronucleus: negative
N-Bromosuccinimide 128-08-5	NCI 1994	A concern for possible chronic adverse health effects related to exposures to *N*-bromosuccinimide (NBS), including possible tumor promotion, is suggested by a structure-activity evaluation of analog data. NBS is available from numerous sources and is widely used in many different kinds of laboratory settings, including academic laboratories; and the potentially exposed populations include students as well as laboratory personnel. NBS was positive in both the Ames and mouse lymphoma assays.	No testing. Since NBS is used as a brominating agent, it could be expected to be corrosive and would probably not produce systemic effects if ingested. Based on the available exposure information it seems likely that a local effect would be observed.
Bromoxynil octanoate 1689-99-2	NIEHS 1995	See Brominated Chemicals	See Brominated Chemicals

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2,3-Butanedione (Diacetyl) 431-03-8	NCI 1994	2,3-Butanedione is a prototype of the subclass of aliphatic alpha-diketones and one of several alpha-diketones in use as photoinitiators in dental composite materials. In addition, the ubiquitous nature of human exposures, due to diacetyl as a natural and synthetic flavor additive was highlighted by the high volume market disappearance rate reported by the FDA. Some association of diacetyl with a cancer risk in animals has been inferred by preliminary but inconclusive studies. In addition, some positive mutagenic effects have been reported for this chemical in various short-term genotoxicity test systems. Testing this chemical would contribute to filling data gaps for this "old" chemical for which human exposures are clearly established. The testing would also contribute to improved understanding of structure-activity relationships associated with those classifications of chemicals, which share the vicinal dicarbonyl structural entity.	- Selected for carcinogenicity/toxicity - Negative in micronucleus assay - Weakly positive in *Salmonella* - Chemical disposition, completed
1,2,3,4-Butanetetracarboxylic acid 1703-58-8	NCI 1989	- Potential use as substitute for formaldehyde-containing finishes in the textile industry - Significant increase of use of chemical is expected in the textile industry - Lack of toxicity data	- CEC and BSC recommended testing - Executive Committee recommended that testing be deferred pending verification of use in the textile industry - Positive in *Salmonella* - Continuous breeding deferred - Teratology report in preparation - Teratology pilot study completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
tert-Butyl formate 762-75-4	U.S. EPA 1996	*t*-Butyl formate (TBF) is an environmental degradation product of methyl *tert*-butyl ether (MTBE) the most widely used motor vehicle fuel oxygenate in the United States. Public health complaints have been voiced regarding acute health effects related to exposure to evaporative and/or exhaust emissions from use of oxygenated gasoline during the winter oxygenate program. Several toxicity studies have been performed on MTBE and the U.S. EPA is developing an extensive oxyfuels health research program. However, the EPA does not plan to pursue or require toxicity studies for TBF. TBF is nominated for NTP toxicity studies (subchronic, neurotoxicity, reproductive & developmental, pulmonary & immunotoxicity.)	Deferred pending receipt of EPA/industry testing data - Negative in *Salmonella*
n-Butyl nitrite 544-16-1	NCI 1989	- Used as a street drug - Potential for human exposure - Positive in *Salmonella* and mouse lymphoma assays - Lack of prechronic and chronic toxicity data	Recommended for carcinogenicity; NTP performed carcinogenicity studies on isobutyl nitrite in lieu of butyl nitrite on the basis that the isobutyl nitrite is the one which is commercially available. isobutyl nitrite (542-56-3): - Subchronic inhalation completed - Carcinogenicity by inhalation published (TR-448 reports CE, MR FR; SE, MM FM) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells in two studies - Positive male/female micronucleus - Positive in *Salmonella* - Negative for sex-linked recessive lethal mutations in *Drosophila*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
tert-Butylcatechol 98-29-3	NCI 1994	Industrial chemical with high and increasing level of production and usage; potential for human exposure; suspicion of carcinogenicity; FDA's interest in potential toxicity of antioxidants; interest in evaluating the toxicity of chemical class of antioxidants.	No further testing, withdrawn by nominator - Dosed feed repeated dose completed - Dosed feed prechronic on test - Chemical disposition completed - Negative in micronucleus assay - Negative in *Salmonella*
Buvicaine 2108-82-9	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Cadmium 7440-43-9	Private Individual 1994	Cadmium is considered by the ATSDR as the sixth most important environmental chemical to human health. However, little research is being performed in the USA on this metal. IARC reclassified cadmium as a Group 1 carcinogen.	In review - Chemical disposition completed
Cafestol 469-83-0	Private Individual 1998	Cafestol, a diterpenoid compound in coffee, has the ability to raise cholesterol levels in humans and to activate the nuclear receptor FXR. While these functions might appear to be unlinked, an association has been established between the ability of some compounds to block isoprenoid synthesis and their anti-growth activities. It has been shown that compounds that induce FXR typically affect cholesterol levels and/or inhibit cell proliferation (Weinberger, unpublished results.) It has generally been observed that compounds having anti-carcinogenic activity exhibit FXR-inducing potential. And on the other hand, some carcinogens antagonize FXR-dependent transcription. For this reason, substances like cafestol that raise cholesterol levels are suspected FXR antagonists and thus "candidate" carcinogens.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Caffeine 58-08-2	Private Individual 1991 Private Individuals 1996	Extensive use, lack of mouse cancer studies; lack of consistent epidemiological data. See Naturally Occurring Chemicals in the Diet	No chronic testing - epidemiology study may be planned by NIEHS. - Prechronic dosed water study completed - Negative in *Salmonella* - Conventional teratology completed Continuous breeding completed See Naturally Occurring Chemicals in the Diet
Carbaryl 63-25-2	NIEHS 1994 Private Individual 1995	See Pesticides and Kids See Carbaryl, Kelthane (Dicofol), Dursban combination exposure	See Pesticides and Kids See Carbaryl, Kelthane (Dicofol), Dursban combination exposure

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Carbaryl, Kelthane (Dicofol), Dursban Combination Exposure	Private Individual 1995	Nominator exposed to chemical via spray directly to the face and subsequently developed several severe symptoms consistent with chemical exposure per medical reports by a team of physicians associated with Gunnar Heuser of California.	All pesticides are regulated by US EPA. Nomination forwarded to EPA Office of Pesticide Programs. The NTP and EPA are working to respond to concerns and to ensure that hazardous chemicals are identified and that the public exposure to them is reduced as much as possible. Dicofol (115-32-2): - Carcinogenicity dosed-feed technical report published (TR-90 reports NE, MR FR FM; CE, MM) - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila;* - Positive in mouse lymphoma - Negative in *Salmonella* Carbaryl (63-25-2) - Juvenile pesticide assessment planned Chlorpyrifos (Dursban) (2921-88-2): - Selected for toxicokinetics; toxicokinetics completed - Immunotoxicity completed - Juvenile pesticide assessment on test - *Salmonella* selected
Carbon Fiber & Carbon Fiber Composite Particulate	Private Individual 1998	The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Carbon tetrachloride 56-23-5	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals	No testing - lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. - Cell proliferation completed - Toxicokinetic study completed - Immunotoxicity completed - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila*; - Negative *Salmonella* in two independent tests
Carbon/Graphite Fiber Composites	United Auto Workers 1994	See Synthetic Mineral Fibers	See Synthetic Mineral Fibers

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Carbonyl sulfide 463-58-1	EPA 1996	Carbonyl sulfide (CS) is a high production chemical that is listed as a hazardous air pollutant under the Clean Air Act amendments of 1990. Even though it is included in a proposed TSCA Section 4 test rule on hazardous air pollutants, the EPA Office of Air Quality Planning and Standards has indicated a more immediate need for health data than might be accommodated under the TSCA rule. An EPA literature search was unable to find any subchronic or chronic toxicity, oncogenicity, or developmental toxicity data. No histopathology has been conducted on the upper or lower respiratory tract following acute, subchronic or chronic exposures. Since CS is chemically reactive, it is expected to react with tissues of the respiratory tract and may have carcinogenic potential. Also, CS is the oxidation product of carbon disulfide which has been shown to be positive in the strain A mouse lung tumor bioassay.	Selected for toxicity via inhalation (including neurotox and ototoxicity), genotoxicity. Decision on chronic testing will be deferred pending results of subchronic tests. - Weakly positive in *Salmonella* - Toxicokinetics on test
[(*o*-Carboxyphenyl)-thio] ethylmercury sodium salt 54-64-8	NIEHS 1988	- Worker exposure - Potential for high consumer exposure (widely used topical anti-infective) - Lack of chronic toxicity data	- Negative in *Salmonella* - *In vitro* cytogenetics studies (CA/SCE) in progress - CEC and BSC recommended no further testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
beta-Carotene 7235-40-7	Private Individual 1996	Millions of Americans are exposed to substantial doses of beta-carotene through highly promoted supplemental vitamins and through addition of beta-carotene to cereals and other products. Clinical trials, including one carried out by the nominator, suggest increases in lung cancer and in total mortality in participants receiving beta-carotene alone or beta-carotene plus vitamin A. The nominator proposes that NTP study the effects of beta-carotene on spontaneous and chemically induced tumor incidences in rodents. Such studies would serve as models for interpretation of human studies, and address the dosimetry and mechanisms of beta-carotene's effects.	In review - Positive in *Salmonella*
beta-Caryophyllene 87-44-5	NCI 1998	The nomination of beta-caryophyllene is based on widespread human exposure and an unknown potential for adverse health effects from long-term exposure. beta-Caryophyllene is found in 80 different food additives and the possible average daily intake from foods has been estimated to be greater than 10 mg. In addition, nearly 45,000 workers are potentially exposed to it in the workplace. The FDA has approved its use in food.	No Testing - insufficient use to warrant testing Negative in *Salmonella*
Catechol 120-80-9	NCI 1989	- Significant production - Widespread occurrence - Potential for high human exposure - Suspicion of carcinogenicity as a benzene metabolite	Renominated for carcinogenicity; No testing. NTP terminated the toxicity study prior to chronic--alternate members of class of hydroxybenzenes were selected; CEC & BSC recommended no testing because other studies were expected to provide sufficient data. Negative in *Salmonella* Negative in micronucleus assay

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Cellulose Insulation	Private Individual 1994	Cellulose insulation is used in several applications with potential for widespread human exposure in the workplace and in the general population. It has been proposed to be a "safe" alternative to asbestos for use in the production of asbestos cement pipe and household/industrial insulation. It has also been proposed as a product that is safer than fibrous glass insulation.	- Selected for carcinogenicity/toxicity testing
alpha-Chaconine 20562-03-2	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet.	See Naturally Occurring Chemicals in the Diet
Chloral 75-87-6	American Water Works Association Research Federation 1991	See Water Disinfection By-Products	See Water Disinfection By-Products
Chloral hydrate 302-17-0	FDA (Center For Drug Evaluation and Research 1991	Widely used in pediatric medicine to sedate children for medical procedures such as minor surgery, diagnostic and dental; evidence of carcinogenic potential in male mice; need to further evaluate the carcinogenicity of chloral hydrate.	- Gavage carcinogenicity study on test - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Inconclusive results for sex-linked recessive lethal mutations in *Drosophila* - Positive in Micronucleus assay - Positive in *Salmonella* - Total reproductive capacity completed
Chlorate (Chlorate Ion) 14866-68-3	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Chlordane 57-74-9 (Reagent Grade) 12789-03-6 (Technical Grade)	NIEHS 1988 Citizens Against Pesticide Misuse 1989	- Previous carcinogenicity studies considered to be inadequate (poor survival rates, dosing problems, rat liver pathology needs to be redone, questions of quality control) - Extensive human exposure - Chlordane has a long half-life and is frequently identified in hazardous waste sites and in ground water - Although chemical is no longer used, there is significant human exposure from contaminated homes - Toxic effects observed in people exposed to chlordane	- NCI/NTP feeding carcinogenicity studies of analytical grade chlordane completed (TR-008) - Analytical grade was negative in *Salmonella* - Negative for CA but positive for SCE in CHO ovary cells - Technical grade was positive in *Salmonella*, and positive in mouse lymphoma assay Recommended for carcinogenicity; nominator will reevaluate nomination and outline request for non-standard test - Positive in mouse lymphoma assay - Positive in *Salmonella*
2-Chloro-1-propanol 78-89-7	Private Individual 1997	Human epidemiology studies (Benson & Teta in British Journal of Industrial Medicine 50: 710-16, 1993) have shown an association between exposure to chlorohydrins and pancreatic lesions. In the NTP 13-week studies, pancreatic lesions were detected in rodents. However, the 2-year studies were conducted at levels below the dose at which the 13-week lesions were seen.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
3-Chloro-4-(dichloromethyl)-5-hydroxy-2(5H)-furanone(MX) 77439-76-0	American Water Works Association Research Federation 1991 NIEHS 1994 EPA (Office of Water) 1995	See Water Disinfection By-Products MX was nominated for evaluation of toxicity/carcinogenicity because it is a by-product of water chlorination and is a potent, direct-acting mutagen in *Salmonella*. Nearly 50% of the mutagenic activity of finished drinking water has been attributed to MX. EPA is particularly interested in the potential carcinogenicity of this chemical. The outcome of studies on MX could influence drinking water standards in the US. See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products - Selected for carcinogenicity/toxicity in dosed water Toxicokinetics, completed Chemical disposition, selected See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)
Chloroethane 75-00-3	EPA 1996	In support of EPA's air toxic risk assessments, EPA needs additional data on chloroethane to help define the inhalation dose response for carcinogenicity and to better characterize the reproductive toxicity. A repeat bioassay of chloroethane in female mice was requested to examine the dose-response relationship involved in the development of uterine tumors.	In review - Inhalation carcinogenicity technical report published (TR-346 reports MR, EE; FR, EE; MM, IS; FM, CE) - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2-Chloroethanol (Ethylene chlorohydrin) 107-07-3	Private Individual 1997	Human epidemiology studies (Benson & Teta in British Journal of Industrial Medicine 50: 710-16, 1993) have shown an association between exposure to chlorohydrins and pancreatic lesions. In the NTP 13-week studies, pancreatic lesions were detected in rodents. However, the 2-year studies were conducted at levels below the dose at which the 13-week lesions were seen.	In review - Carcinogenicity dermal technical report published; TR-275 reports no evidence of carcinogenic activity for male or female rats or mice. - Chromosome aberrations: negative - *In vitro* cytogenetics: positive (chromosome aberrations); positive (sister chromatid exchanges) - *Drosophila* (sex-linked recessive lethal/reciprocal translocation): negative - Mouse lymphoma: positive - Micronucleus: negative - *Salmonella*: positive in 3 independent tests - Sister chromatid exchanges: negative - Conventional teratology (intravenous) – completed
bis(2-Chloroethyoxy)methane 111-91-1	NIEHS 1998	This nomination is based on bis(2-chloroethoxy)methane's high production volume and the lack of toxicology studies. (Zeiger 10/6/98)	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Chloroform 67-66-3	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically-based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No additional testing will be done -- due to a lack of resources and prior testing, the nomination faculty decided that it was in the best interest of the Government and general public not to test this chemical. - Carcinogenicity gavage technical report published (TR-00 published 1976 reports CE, MR MM FM; NE, FR) - Toxicokinetic Study Completed - Continuous breeding, completed - Negative for chromosome aberrations - Inconclusive for chromosomal aberrations and negative for sister chromatid exchanges in chinese hamster ovary cells - Positive in mouse lymphoma in two independent tests - Positive in micronucleus assay - Negative in *salmonella* - Negative for sister chromatid exchanges
Chlorogenic acid 327-97-9	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
p-Chloro-*m*-xylenol (PCMX) 88-04-0	Private Individual 1995	Though PCMX has been used as an active antimicrobial agent in OTC topical health care antiseptic products for over 50 years, FDA has recommended that NIPA laboratories conduct 90-day dose range-finding studies and lifetime carcinogenicity studies to confirm the safety of this product and to establish essential toxicological parameters. Because the concentration of PCMX in antiseptic products is low, only a small amount of PCMX is manufactured thus it will be difficult for NIPA to pay for these expensive long-term toxicological tests from funds generated from the sale of this "low volume" chemical. NIPA is requesting that NTP perform the tests requested by the FDA.	See Benlate DF with flusilazole and chlorothalonil In review FDA published the Tentative Final Monograph for Health Care Antiseptic Drug Products: Proposed Rule (FR Vol. 59, No 116, pages 31402-31452) dated June 17, 1994. NTP will consider PCMX for short- & long-term tests & pharmacokinetics studies in lab animals but NTP does not perform human studies.
Chloropicrin 76-06-2	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically-based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency with many commonly used chemicals.	No Additional Testing - Lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. - Gavage technical report published (TR-65 Reports IS, MR FR; NE, MM FM) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Inconclusive for sex-linked recessive lethal mutations and reciprocal translocation in *Drosophila* - Positive in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
o-Chloropyridine 109-09-1	NCI 1997	*o*-Chloropyridine's nomination is based on: 1) increasing production and use as a pharmaceutical and agrochemical intermediate; 2) potential for occupational and environmental exposures; 3) evidence of mutagenicity based on results in several short-term test systems; and 4) suspicion of carcinogenicity based on structure and evidence of mutagenic or carcinogenic effects associated with structurally related chemicals.	Selected - In review
Chlorothalonil 1897-45-6	State of Florida, Dept. of Health & Rehab System 1995	See Benlate DF with flusilazole and chlorothalonil	See Benlate DF with flusilazole and chlorothalonil

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Chlorpyrifos (Microencapsulated) (Dursban) 2921-88-2	Citizens Against Pesticide Misuse 1989 Private Individual 1994 NIEHS 1994 Private Individual 1995 Workplace Health Services 1996	- Used as a replacement of chlordane Toxic effects observed in people exposed to chlorpyrifos. Human exposure. This pesticide has become the most frequent cause of injury among the patients seen by the nominator. See Pesticides and Kids See Carbaryl, Kelthane (Dicofol), Dursban combination exposure The microencapsulated chlorpyrifos is designed to cause the chemical to stick to surfaces and last longer as a surface toxicant for insects. The nominator hypothesizes that the nervous system of humans exposed by inhalation to the microencapsulated chemical may develop serious disruption of normal acetylcholine-mediated synaptic transmission. The chemical may be delivered to the olfactory nuclei by direct olfactory nerve axonal transport. From there the cholinergic effects of the toxin could act directly on the cholinergic tracts from the forebrain and the cholinergic radiations to the nuclei within the limbic system.	Chlorpyrifos (Dursban) (2921-88-2): - Recommended for toxicity and carcinogenicity; - Toxicokinetics study completed and new study nominated - Selected for *Salmonella* - Immunotoxicity completed - Juvenile pesticide assessment completed; Referred to EPA - Toxicokinetics, completed - Immunotoxicity, completed See Pesticides and Kids See Carbaryl, Kelthane (Dicofol), Dursban combination exposure. Nomination deferred. Nomination letter forwarded to US EPA, currently evaluating effects from exposure to chlorpyrifos.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Chromium picolinate 14639-25-9	Private Individual 1998 NCI 1998	Chromium picolinate is being marketed as a dietary supplement used for weight loss. A study conducted in 1995 by Dartmouth College & George Washington University found that chromium picolinate caused significant chromosome damage to Chinese hamster ovary cells when the rodents were exposed to a non-toxic dose. Damage was found to be dose-dependent. The nomination of chromium picolinate is based on the potential for widespread consumer exposure. Marketed as a dietary supplement, chromium picolinate is heavily promoted as a muscle builder and weight-loss agent. Some researchers suggest that chromium picolinate causes a significant increase in lean body mass by altering the rate of internalization of insulin. Other investigators have indicated that recommended doses of chromium picolinate by other than the oral route would cause accumulation of chromium in the liver and kidneys, an unknown risk to the consumer.	In review
Cimetidine 51481-61-9	Private Individual 1991	This commonly used gastric acid inhibitor appears to increase SCE frequency in ulcer patients and following in-vitro incubation of human lymphocytes. It also produces chromosomal aberrations in rodent models. Inadequate testing for carcinogenicity	Nomination in review
1,8-Cineol 470-82-6	NIEHS 1996	See Synthetic Fragrances	See Synthetic Fragrances

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Cinnamaldehyde 104-55-2	FDA 1989	- Important flavoring agent in food - Significant human exposure - Suspicion of carcinogenicity based on structural considerations - Lack of adequate carcinogenicity data	Selected for carcinogenicity testing - Prechronic studies completed - Short term *in vivo* reproductive toxicity (STIV) study completed - Mechanisms completed - Toxicokinetics completed - Micronucleus negative *trans*-Cinnamaldehyde (14371-10-9) - Prechronic gavage and microencapsulation completed - Chronic carcinogenicity (microencapsulation in feed) on test - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Positive for sex-linked recessive lethal mutations and negative for reciprocal translocation in *Drosophila* - Negative in *Salmonella* study and weakly positive in *Salmonella* study
Citronellol 106-22-9	NCI 1997	Citronellol's nomination is based on high production volume, widespread human exposure, and an unknown potential for adverse health effects from long-term administration. Citronellol is found in 17 different spices and it is a common flavoring in beverages and foods. It is one of the most widely used fragrance materials. Occupational exposure to citronellol in the United States is significant, estimated to be over 160,000 workers in 62 industries. It is also closely related to citronellal and seven esters also having GRAS status.	Deferred by the ICCEC pending the results of the Citral study

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Cobalt Dust	United Auto Workers 1994 Private Individual 1998	See Metals The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Metals In review
Cobalt Metal Dust And Soluble Cobalt Chemicals	United Auto Workers 1989	- High occupational exposure - Known toxic effects of cobalt inhalation exposure as indicated from occupational inhalation studies	- Nominated for carcinogenicity - Deferred pending completion of NTP chronic studies of cobalt oxide, cobalt sulfate heptahydrate, and cobaltocene Cobalt Sulfate Heptahydrate (10026-24-1): - Prechronic inhalation toxicity study published (TOX-05) - Chronic inhalation carcinogenicity study-published (TR-471) - Weakly positive in *Salmonella*
Cobalt sulfate heptahydrate 10026-24-1	United Auto Workers 1989	See Cobalt metal dust and soluble cobalt chemicals	See Cobalt metal dust and soluble cobalt chemicals
Cocaine 50-36-2	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Comfrey 72698-57-8	NIEHS 1998	The nomination of comfrey and symphytine by the NIEHS for testing is based on the potential for chronic human exposure and the limited amount of carcinogenicity data.	Selected

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Copper and Copper Compounds	State of California EPA (OEHHA) 1995	A component in facility chemical emissions lacking acute exposure data.	No testing - lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. Copper and inorganic compounds (7440-50-8): - chemical disposition completed
p-Coumaric acid 7400-08-0	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Crystalline silica	NIEHS 1994	Inhalation of excessive levels of crystalline silica is best known as a cause of pneumoconiosis, an occupational lung disease. It is unclear whether the carcinogenic risk of crystalline silica is because it is a traditional carcinogen that interacts with nuclear macromolecules or because of an epigenetic process associated with cell damage and healing. A long term experimental study that includes exposure levels below those that cause pulmonary fibrosis and correlative pathologic studies relating lung tumors to fibrotic nodules can better judge which mechanism is likely to underlie crystalline silica's carcinogenic potential. It is imperative that an adequately designed rodent study be initiated to allow a determination of cancer risk from low level respirable exposures to crystalline silica.	In review Silica, crystalline - quartz (14808-60-7) - subchronic inhalation completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Silica, Crystalline-Quartz 14808-60-7	State of California Dept of Health Services, Health & Welfare Agency 1991 NIEHS 1994	Possible Human carcinogen (IARC). Because of its widespread occurrence, it is important that its carcinogenicity (and the mechanism of such carcinogenicity) be thoroughly substantiated so that unnecessary controls on its release into the environment are not promulgated. There is evidence that silica is carcinogenic in rats by inhalation and in rats and other animals by injection, and that it is able to cause mammalian cell transformation. However, only one species (rats) has been positive in three inhalation studies, the most relevant route for man. Inhalation of excessive levels of crystalline silica is best known as a cause of pneumoconiosis, an occupational lung disease. It is unclear whether the carcinogenic risk of crystalline silica is because it is a traditional carcinogen that interacts with nuclear macromolecules or because of an epigenetic process associated with cell damage and healing. A long term experimental study that includes exposure levels below those that cause pulmonary fibrosis and correlative pathologic studies relating lung tumors to fibrotic nodules can better judge which mechanism is likely to underlie crystalline silica's carcinogenic potential. It is imperative that an adequately designed rodent study be initiated to allow a determination of cancer risk from low level respirable exposures to crystalline silica.	Prechronic inhalation study completed In review Silica, crystalline - quartz (14808-60-7) - subchronic inhalation completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Cumene 98-82-8	NIEHS 1996	Large segments of the population are exposed to cumene due to its high level of production and its presence in fuels. Approximately 18 million pounds of cumene were released into the environment annually. In 1988 the EPA estimated that about 3 million pounds of cumene were released from manufacturing and processing facilities and 15 millions pounds were released from vehicle emissions. Numerous short-term studies have been performed on cumene, but it has not been tested for chronic toxicity.	Selected for carcinogenicity testing - Positive in micronucleus assay - Negative in *Salmonella*
Cumene hydroperoxide 80-15-9	NIEHS 1998	Cumene hydroperoxide's nomination is based on high production volume and an absence of chronic data. (memo)	In review
Cyanogen chloride 506-77-4	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)
Cyclohexene cxide 286-20-4	NCI 1993	Cyclohexene oxide is a representative cycloalkene monoepoxide. Cyclohexene oxide is a compound that is present in natural products and has a wide range of uses including laboratory and production of other intermediates that have human exposure.	In review for further testing. - Topical repeated dose completed - Gavage repeated dose completed - Chemical disposition completed - Negative in micronucleus assay - Positive in *Salmonella* in two independent tests; negative in another *Salmonella* test

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2-Cyclohexene-1-one (930-68-7)	NCI 1992	2-Cyclohexene-1-one (CHO) is a representative cyclic alpha, beta-unsaturated ketone, with broad human exposure, potential for biological activity, and lack of chronic toxicity data. Besides being used widely in industrial and academic research labs, this chemical poses an ubiquitous human exposure risk having been identified as a component of tobacco smoke and other consumed products, a contaminant of surface and drinking water, an air pollutant, and hazardous waste site contaminant.	- Subchronic inhalation completed - Negative in Micronucleus assay - Negative in *Salmonella*
2,4-Decadienal 25152-84-5	NCI 1993	See Dienaldehydes	See Dienaldehydes
Dehydroepiandrosterone 53-43-0	NCI 1998	DHEA is nominated for study because of its potential for widespread human consumption as a dietary supplement. DHEA is a steroidal hormone and its consumption can boost testosterone levels dramatically. It is being promoted as a muscle builder and to slow the aging process and as a weight loss aid. Before passage of the Dietary Supplement Health & Education Act of 1994, DHEA was available only by prescription from compounding pharmacies. Now, it is being sold over-the counter; current use patterns may pose an unreasonable risk to some consumers. Several limited animal studies suggest that DHEA is a suspect liver carcinogen and increased cancer risks have been associated with increasing DHEA blood levels in some epidemiological studies.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dehydroepiandrosterone sulfate (DHEA) 651-48-9	Private Individual 1997	DHEA is currently classified as a dietary supplement and is available over-the-counter. Since the Dietary Supplement and Education Act of 1994, the FDA does not evaluate such products before they reach the market. DHEA is an endogenous adrenal cortical steroid, which is converted to testosterone and/or estrone in the body. DHEA and/or its reduced metabolite, 5-ene-androstene-3beta, 17beta-diol (ADIOL) should be evaluated in a full range of studies to investigate its efficacy as well as its toxicity on young, adult, and senescent animals.	In review
Dehydroepiandrosterone sulfate, Sodium Salt (DHEA) 78590-17-7	Private Individual 1997	DHEA is currently classified as a dietary supplement and is available over-the-counter. Since the Dietary Supplement and Education Act of 1994, the FDA does not evaluate such products before they reach the market. DHEA is an endogenous adrenal cortical steroid, which is converted to testosterone and/or estrone in the body. DHEA and/or its reduced metabolite, 5-ene-androstene-3beta, 17beta-diol (ADIOL) should be evaluated in a full range of studies to investigate its efficacy as well as its toxicity on young, adult, and senescent animals.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Diacetone alcohol (DAA) 123-42-2	NCI 1993	The nomination of diacetone alcohol was based on the high production volume, widespread and increasing uses of the chemical, the potential for occupational and consumer exposure to the chemical as an atmospheric and surface water contaminant, and through its uses as a solvent and food additive. It is used as a substitute for methyl butyl ketone, in some cases in an attempt to lower the volatile nature of paint. Diacetone alcohol is a metabolite of methyl isobutyl ketone (MIBK). It was recommended that diacetone alcohol be tested in coordination with MIBK.	Deferred in order to review data submitted by industry on Methyl isobutyl ketone (MIBK), which is a precursor to diacetone alcohol. DAA will be reconsidered following review of new data on MIBK in subsequent meetings. - Negative in *Salmonella* in two independent tests
Diazoaminobenzene 136-35-6	NIEHS 1988	- Worker exposure (widely used in scientific laboratories) - Existing carcinogenicity studies (oral) were equivocal - Positive in *Salmonella*	- Positive in *Salmonella* - Subchronic skin paint studies on test - Toxicokinetics completed
1,2-Dibromo-2,4-dicyanobutane 35691-65-7	NIEHS 1995	See Brominated chemicals	See Brominated chemicals
Dibromoacetic acid 631-64-1	American Water Works Association Research Federation 1991 EPA (Office of Water) 1995	See Water Disinfection By-Products See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dibromoacetonitrile 3252-43-5	American Water Works Association Research Federation 1991 EPA 1997	See Water Disinfection By-Products The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBPs, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	See Water Disinfection By-Products Selected for testing under Water Disinfection By-Products initiative - *Drosophila* (sex-linked recessive lethal/reciprocal translocation): negative - *Salmonella*: weakly positive - *Salmonella*: inconclusive - Repro/developmental/General toxicity (28-day) (SCREEN) (Dosed-Water) - completed
1,2-Dichloro-1,1-difluoroethane 1649-08-7	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
2,3-Dichloro-1,3-butadiene 1653-19-6	NIEHS 1997	The nomination of 2,3-dichloro-1,3-butadiene is based on the lack of toxicity and carcinogenicity data.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dichloroacetic acid 79-43-6	EPA 1988 EPA (Office of Water) 1995 EPA 1997	- Breakdown product of drinking water disinfectants - High human exposure Suspicion of carcinogenicity See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBPs, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	- Available chronic oral studies in mice indicated that dichloroacetic acid is a hepatocarcinogen - Deferred in order to ascertain from EPA whether additional testing is needed - Positive in *Salmonella* See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) Selected for testing under the Water Disinfection Model and Water Disinfection Byproducts initiatives. - Spermiation inhibition (gavage): report in preparation
Dichloroacetonitrile 3018-12-0	Private Individual 1990 American Water Works Association Research Federation 1991	- By-product formed during disinfection of drinking water - Potential for human exposure Soft tissue malformations, cardiovascular and urogenital anomalies observed in oral toxicity studies in laboratory animals See Water Disinfection By-Products	- Nominated for carcinogenicity, reproductive and developmental studies; under review - see Water Disinfection Byproducts nomination - FY 1991 and FY 1995 - Positive in *Salmonella* - Weakly positive for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells Positive for sex-linked recessive lethal mutations and negative for reciprocal translocation in *Drosophila*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
p,p´-Dichlorodiphenoldichloroethylene 72-55-9	University of Cincinnati 1994	See Pesticides and Herbicides	See Pesticides and Herbicides
Dichlorodiphenyltrichloroethane (DDT) 50-29-3	Private Individual 1994 University of Cincinnati 1994	See Pesticides and Herbicides	See Pesticides and Herbicides
1,2-Dichloroethane 107-06-2	NIEHS 1991	Study to examine class of halogenated ethanes	- Gavage, carcinogenicity technical report published (TR-055 reports CE, MR FR MM FM). - Prechronic gavage and dosed water toxicity report published (TOX-04) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells; - Negative in Micronucleus assay in two studies; - Positive in *Salmonella*
2,4-D (2,4-Dichlorophenoxyacetic acid) 94-75-7	Private Individual 1991	Continuing interest to public health as well as to mechanisms.	No chronic testing - issues being addressed & industry has done a chronic study. - Chemical disposition completed - Toxicokinetics study completed - Neurotoxicity assessment completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* - Negative in *Salmonella* in two independent studies

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dichloropropane (Propylene dichloride) (78-87-5)	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically-based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No additional testing due to limited resources and existing data from prior testing - Gavage carcinogenicity technical report published (TR-263 reports NE, MR; EE, FR; SE, MM FM) - Negative for chromosome aberrations - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations and reciprocal translocation in *Drosophila* - Positive in mouse lymphoma - Weakly positive in *Salmonella* in two independent tests - Negative for sister chromatid exchanges
Dicofol 115-32-2	Private Individual 1995	See Carbaryl, Kelthane (dicofol), Dursban combination exposure	See Carbaryl, Kelthane (Dicofol), Dursban combination exposure

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dicyclohexylcarbodiimide (DCC)/ Diisopropylcarbodiimide (DIC)	NCI 1993	There is widespread low-level exposure, and an absence of data on health effects. Both DIC and DCC have been used in industry as stabilizing agents, coupling agents, and condensing agents. The potential for exposure exists during the synthesis of polypeptides and other chemicals in the chemical and pharmaceutical industries, as well as during protein synthesis in the recombinant DNA industry. It is reasonable to assume that all alkylcarbodiimides are capable of functioning as alkylating agents and are therefore potential vesicants and carcinogens. Evidence on which to evaluate the potential for human carcinogenicity is lacking.	Under consideration for further testing. Dicyclohexylcarbodiimide (538-75-0): - Subchronic completed - Immunotox completed - Negative in micronucleus assay; weakly positive in another micronucleus assay - Negative in *Salmonella* Diisopropylcarbodiimide (693-13-0): - Subchronic topical completed - Immunotoxicity completed - Positive in two micronucleus assays and negative in one test - Negative in *Salmonella*
Dienaldehydes	NCI 1993	2,4-Hexadienal & 2,4-decadienal are contained in a variety of foods and food components where both are regulated as additives and flavoring agents. They are also known to be lipid peroxidation products found in meat, vegetable and fish oils. Several researchers have implied that there would be a link between exposure to lipid peroxidation products and the development of human cancers. Since both compounds are naturally occurring breakdown products of unsaturated fats, they constitute a prospective problem in the area of nutrition and cancer, especially since tumorogenic activity by these compounds would be consistent with a role of lipid peroxidation in carcinogenesis.	2,4-Hexadienal (142-83-6): - Gavage repeated dose completed - Gavage prechronic completed - Gavage chronic on test - Micronucleus on test - Positive in *Salmonella* in two independent tests 2,4-Decadienal (25152-84-5): - Gavage repeated dose completed - Gavage subchronic completed - Gavage chronic on test - Micronucleus on test - Negative in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Diesel Fuel No. 2 68476-34-6	NIOSH 1998	Diesel fuel No. 2 was nominated for study due to the high number of workers potentially exposed and the high production level of the fuel. Subchronic and chronic inhalation toxicity and carcinogenicity data and developmental toxicity following dermal exposure are lacking. Neurotox effects reported following acute inhalation vapor exposure merit additional investigation.	In review
Diethanolamine 111-42-2	United Auto Workers 1994	See Machining fluid constituents	See Machining fluid constituents
Diethylamine 109-89-7	NIEHS 1997	Nomination of diethylamine is based on high production volume, ubiquitous natural occurrence in trace amounts, and lack of sufficient chronic study data. Diethylamine has been detected in fresh and processed foods. Exposure may also occur endogenously; some drugs are metabolized to diethylamine. Occupational exposure was listed as 28,361 persons (NIOSH, 1984) and occurs mostly among chemical industry workers, machinery operators or health service workers.	No testing - Subchronic inhalation studies considered adequate. The chemical is too corrosive for humane study in animals at high concentrations.
Diethylene glycol 111-46-6	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
1,2-Difluro-1,1,2,2-tetrachloroethane 76-12-0	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2,5-Dimercapto-1,3,4-thiadiazole (DMTD) 1072-71-5	Chemonics industries 1994	DMTD is a chemical that has been used in retardant formulation for years but no information on the health-related effects is available.	In review
Dimethyl adipate 627-93-0	CPSC 1994	Dimethyl adipate (DMA) was nominated because of widespread consumer exposure. Its primary consumer use is as a replacement for methylene chloride in paint strippers. This use is expected to increase because more stringent standards for methylene chloride exposure may be established. There is the potential for workers to be occupationally exposed to DMA and systemic exposure is primarily by inhalation of an aerosol or through percutaneous absorption. There is limited toxicity data available.	- Selected for carcinogenicity/toxicity - Equivocal in micronucleus assay - Negative in *Salmonella*
Dimethyl disulfide 624-92-0	NCI 1988	- High and increasing production volume - Increasing usage - Identified in various food stuffs, a municipal potable water supply, and in ponds, lakes and ocean water - Potential for human exposure - Lack of toxicity data	- Nominated for carcinogenicity studies - Under review - Negative in *Salmonella* in two independent tests
Dimethylaminopropyl chloride, hydrochloride 5407-04-5	NCI 1995	Dimethylaminopropyl chloride, hydrochloride (DMPC) has the potential for human exposure because of its wide use as an industrial and research organic intermediate. It is a member of the nitrogen mustard-type chemical class, which is associated with genetic toxicity and DNA-damaging effects. DMPC was mutagenic in *Salmonella* strains with and without metabolic activation. Recommend completing mutagenicity testing in other *in vitro* systems before considering for carcinogenicity.	- Selected for toxicity/carcinogenicity - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dimethylethanolamine 108-01-0	NIEHS 1997	Dimethylethanolamine was nominated based on its widespread use and exposure potential.	No testing
Dimethylethylamine 598-56-1	Private Individual 1998	The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	In review
Dimethylformamide 68-12-2	a) Private Individual b)Private Individual 1991	a) Need for additional studies in combination with heavy metals. b) Extremely large production amounts and immense numbers of people being exposed	No additional testing - adequate rodent carcinogenicity studies performed by industry. - Prechronic inhalation toxicity report published (TOX-22) - Continuous breeding completed - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* in two tests - Positive in Mouse Lymphoma; - Negative in two other Mouse Lymphoma tests - Negative in *Salmonella*
Dimethyloldihydroxy-ethyleneurea 1854-26-8	NIEHS 1998	The nomination of the methylolurea class compounds by the NIEHS for testing is based on high production volumes (including urea-formaldehyde resins which contain methylolurea or dimethylolurea as impurities), the potential for human exposure, and the lack of data on carcinogenicity.	Deferred - Chemical Disposition (Gavage; Intravenous; Topical): completed - Toxicokinetic Study (Gavage; Intravenous; topical): completed - *Drosophila*: positive (sex-linked recessive lethal); negative (reciprocal translocation) - Positive in *Salmonella* - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dimethylolurea 140-95-4	NIEHS 1998	The nomination of the methylolurea class compounds by the NIEHS for testing is based on high production volumes (including urea-formaldehyde resins which contain methylolurea or dimethylolurea as impurities), the potential for human exposure, and the lack of data on carcinogenicity.	Deferred
Dimethylolurea dimethyl ether 141-07-1	NIEHS 1998	The nomination of the methylolurea class compounds by the NIEHS for testing is based on high production volumes (including urea-formaldehyde resins which contain methylolurea or dimethylolurea as impurities), the potential for human exposure, and the lack of data on carcinogenicity.	Deferred

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dioxin Toxic Equivalence Factor Studies	NIEHS/EPA 1995	Scientists from NIEHS and EPA formed a committee to address issues concerning dioxins and toxic equivalency factors (TEFs). The activity of some members of this class of compounds is generally expressed relative to the prototypical 2,3, 7,8-tetrachlordibenzo-*p*-dioxin due to the existence of a common mechanism of action, i.e., binding to the AH receptor. The use of TEFs to predict carcinogenicity remains an unresolved concept because of the limited database on carcinogenicity of this class of compounds. The purpose of this study is to expand the database on the applicability of TEFs in predicting carcinogenicity.	Toxic Equivalency Factor Evaluation (TCDD) (1746-01-6): - Ggavage, technical report published (TR-209) - Chronic gavage on test - Chemical disposition completed - Mechanisms completed Toxic Equivalency Factor Evaluation (Pentachlorodibenzo-*p*-dioxin) (40321-76-4): - Selected for toxicokinetics Toxic Equivalency Factor Evaluation (Pentachlorodibenzofuran) (57117-31-4): - Chronic gavage on test - Chemical disposition completed - Toxicokinetic study completed - Teratology completed Toxic Equivalency Factor Evaluation (dioxin mixture): - Chronic gavage on test - Selected for toxicokinetics

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Dioxin Toxic Equivalence Factor Studies (continued)			Toxic Equivalency Factor Evaluation (PCB 126) (57465-28-8): - Chronic gavage on test - Toxicokinetic study on test Toxic Equivalency Factor Evaluation (2,2′,4,4′,5,5′-Hexachlorobiphenyl (PCB 153)) (35065-27-1): - Chronic gavage on test; - Toxicokinetic study selected Toxic Equivalency Factor Evaluation (binary mixture): - Chronic gavage on test; - Selected for toxicokinetics
Dipentaerythritol 126-58-9	NIEHS 1997	High production, inadequate or no tox studies.	In review
Diphenyl amine (*N*-Phenylbenzenamine) 122-39-4	Private Individual 1994	Health concerns including normal handling by personnel and ingestion in pharmaceuticals and food. Determine if DPA, when purified of known hazardous by-products, is less toxic than what may have been determined in earlier work.	- Negative in *Salmonella* - Carcinogenicity studies deferred pending industry toxicity and oncogenicity studies as required under FIFRA re-registration guidelines as a pesticide regulated by EPA
2,2′-Dipyridyl 366-18-7	NCI 1994	2,2′-Dipyridyl was positive in an Ames assay and two studies cited in PHS-149 supported a suspicion of carcinogenicity. It is an important agricultural chemical intermediate as the precursor of the herbicide, diquat, and a metal chelating agent with numerous uses. As the principle starting material in the manufacture of diquat and a potential break-down product in environmental media from diquat's agricultural use, 2,2′-dipryridyl can be considered a strong candidate for nomination.	No testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
C.I. Disperse Red 60 17418-58-5	NCI 1989	See Dyes	See Dyes
Dyes	NCI 1989	Nominated from a study of non-azo/non-anthraquinone dyes - Most important dye in the rosamine category of xanthene dyes - High potential for human exposure - Interest in determining the activity of the sulfonated rhodamine structure	Reviewed by CEC - recommended that the dyes be reviewed not only within the context of structural chemical classes but also as part of a complete dye class. Deferred until information is retrieved to evaluate them as part of complete class. Also unanimously recommended that the dyes should be reviewed at a meeting in which dyes would be the main agenda - structures are not available and will be requested. C.I. Acid Red 52 (3520-42-1): Private industry sent to NTP copies of toxicity studies. Based on the results of these studies, they recommended that the NTP not test CI Acid Red 52 C.I. Disperse Red 60 (17418-58-5): - Positive in *Salmonella* - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells
Ecdysterone 5289-74-7	NCI 1993	Because of its structure as a steroid and its androgenic activity as an anabolic steroid, the CDC, FDA and NCI are concerned about the use/abuse of this drug by athletes, body builders and teens. It is suspected of being carcinogenic. In some countries it is under evaluation as an anti-arrhythmic, accelerator of bone healing, wound healing and skin regeneration.	Withdrawn - chemical is not available in over-the-counter drugs as originally suspected and pure compound is too expensive to test. NTP recommended that the chemical be removed from consideration for testing with the understanding that it can be recommended at a later date if actual human exposure is demonstrated.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Echinacea	NCI 1998	Echinacea is the most popular herbal supplement in the US used to stimulate the immune system. Echinacea is nominated for its potential for widespread human exposure and the lack of scientific literature supporting its safety or efficacy.	In review
Endocrine Disrupter Project	NIEHS 1996	The purpose of these studies is to determine if exposures to environmental chemicals that disrupt endocrine pathways can affect reproduction or the incidence of reproductive tumors.	Endocrine disrupter (Endosulfan) (115-29-7): In review Endocrine disrupter (Nonylphenol) (104-40-5): - Multigen, on test Endocrine Disrupter (Vinclozolin) (50471-44-8): - Multigen, on test Endocrine Disrupter (Genistein) (446-72-0): - Multigen, on test Endocrine Disrupter (Methoxychlor) (72-43-5): - Multigen, on test Endocrine Disrupter (Ethinyl Estradiol) (57-63-6): - Multigen, on test
Endosulfan 115-29-7	NIEHS 1996	See Endocrine Disrupter Project	See Endocrine Disrupter Project
Epicatechin 490-46-0	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Epichlorohydrin 106-89-8	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No testing - chemical to difficult to procure or handle. - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in *Salmonella*
Ethanol 64-17-5	Private Individual 1991	See Ethyl Alcohol.	See Ethyl Alcohol
Ethanolamine 141-43-5	United Auto Workers 1994 Private Individual 1998	See Machining fluid constituents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Machining fluid constituents In review - *Salmonella*: Negative - Teratology pilot study completed
Ethidium bromide 1239-45-8	Private Individual 1994	Ethidium bromide is a known mutagen, but its carcinogenicity and toxicity have not been adequately evaluated. Because ethidium bromide interchelates with the bases in DNA, it is commonly used for identification of DNA in research settings.	No testing - Negative in two micronucleus assays - Positive in *Salmonella*
Ethinyl estradiol and/or mestranol	Private Individual 1991	Use of oral contraceptive steroids has been associated with increased incidences of liver neoplasms in women. In many studies these compounds were concluded to be promoters of hepatocarcinogenesis. IARC monograph (Vol. 21) includes reviews of animal carcinogenicity studies on these compounds, but does not provide full information of strains of animals used, doses, or survival within individual dose groups.	Referred to NIEHS functional toxicology group for interest and testing consideration. Ethinyl estradiol (57-63-6): - Negative in *Salmonella* in two independent studies

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Ethoxyquin 91-53-2	FDA 1990	- Used as an antioxidant in animal feed - Uncertainty concerning its toxicological effects stemming from reports of purported toxicity in dogs - Need for adequate toxicity data to re-evaluate the currently approved levels in animal feed and human food	Industry studies currently being reviewed before additional NTP testing is undertaken. - Prechronic dosed-feed studies completed - Chemical disposition, metabolism, and toxicokinetics completed - Teratology pilot studies completed - Negative in *Salmonella* - Negative in micronucleus assay - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells
Ethyl acetate 141-78-6	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Ethyl alcohol 64-17-5	NIEHS 1988 Private Individual 1991	- High human exposure - International Agency for Research on Cancer (IARC) concluded that there is sufficient evidence of carcinogenicity for alcoholic beverages in humans Lack of good animal studies None given by nominator.	- Carcinogenicity (dosed-water) on test - Continuous breeding studies completed - Teratology completed - Negative in *Salmonella* Urethane/Ethanol combination study: - Subchronic dosed water toxicity study published (TOX-52) - Carcinogenicity study (dosed-water) on test - Chemical disposition completed - Toxicokinetics completed - Positive in male/female micronucleus assay AZT/Ethanol combination: - Continuous breeding completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Ethyl bromoacetate 105-36-2	NCI 1996	The nomination of ethyl bromoacetate is based on its potential for human exposure through its uses as a chemical intermediate, lack of chronic toxicity data, and a suspicion of carcinogenicity based on its alkylating activity. Recommended for metabolism & *in vitro* cytogenetics.	Selected for metabolism studies
Ethyl cyanoacrylate 7085-85-0	NCI 1991	Widespread use as consumer instant adhesive, lack of toxicity data, potential biological activity	Withdrawn - Negative in Micronucleus in two assays; - Negative in *Salmonella*
Ethyl silicate 78-10-4	NCI 1997	Ethyl silicate's nomination is based on: 1) its potential for occupational exposures based on high production volume (7-20 million lbs) and estimate of potential worker exposures in the National Occupational Exposure Survey (NOES); 2) evidence of occupational exposures based on TLV and other literature documentation; 3) suspicion of carcinogenicity based on a significant increase in unscheduled DNA synthesis in rat hepatocytes, some positive genetic toxicity results in tests with structurally related chemicals, and evidence of kidney damage in animals following repeated (subacute) low level exposures; and 4) lack of a full battery of genetic toxicity tests and lack of chronic toxicity data.	Deferred by the ICCEC

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Ethyl vinyl ketone 1629-58-9	NCI 1992	Ethyl vinyl ketone (EVK), an alkylating agent and Michael acceptor, is used as a reagent in organic synthesis and polymerization monomer. The principal use of EVK however, is as a natural and synthetic flavoring substance resulting in broad human exposure. The limited available test data on this compound include demonstrations of positive mutagenicity and the formation of DNA-damage adducts which have lead one research group to conclude that EVK may pose a mutagenic and carcinogenic risk.	- Subchronic inhalation on-test; - Negative in micronucleus assay - Positive in *Salmonella*
2-Ethyl-1,3-hexanediol 94-96-2	NCI 1993	Limited developmental toxicity studies have been completed, and the results led to EPA action resulting in voluntary cancellation of pesticide registration. It would be useful to have another study using lower doses and more animals.	Deferred pending an evaluation of an industry study and EPA's risk management assessment. - Negative in *Salmonella*
2-Ethyl-2-hexenal 645-62-5	NIEHS 1997	The nomination of 2-ethyl-2-hexenal is based on high production volumes and the potential for human exposure, and the lack of data on carcinogenicity.	In review - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Ethylbenzene 100-41-4	Private Individual 1991	Continuing interest to public health; large volume chemical; human exposure; lack of adequate evaluation for biological or toxicological effects.	- Inhalation prechronic toxicity report published (TOX-10) - Inhalation carcinogenicity technical report peer reviewed 12/96 (TR-466 reports CE, MR; SE, FR MM FM) - Toxicokinetics study on test. - Teratology completed - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in Mouse Lymphoma - Negative in Micronucleus assay - Negative in *Salmonella*
Ethylene 74-85-1	Private Individual 1991	Large volume chemical; human exposure; lack of adequate evaluation of biological or toxicological effects.	In review
di-2-ethylhexanol 68915-36-6	United Auto Workers 1994	See Synthetic Polymer Process Emissions	See Synthetic Polymer Process Emissions
2-Ethylhexanol 104-76-7	Private Individual 1998	The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	In review - *In vitro* Cytogenetics: Negative (Chromosome Aberrations); Negative (Sister Chromatid Exchanges) - *Salmonella*: Negative - Teratology completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2-Ethylhexyl 2-cyano-3,3-diphenyl acrylate 6197-30-4	NCI 1990	- Nomination resulted from a class study of sunscreen ingredients - Potential for human exposure - Suspicion of carcinogenicity based on structural considerations (presence of 2-ethylhexyl and acrylate moieties)	Withdrawn by nominator based on adequate industry testing. Consult w/ FDA re: sunscreen preparations - Negative in *Salmonella*
2-Ethylhexyl *p*-methoxycinnamate 5466-77-3	NCI 1990	- Nomination resulted from a class study of sunscreen ingredients - High usage - Potential for human exposure - Available toxicity studies implicated the chemical as a potential tumor promoter - Suspicion of carcinogenicity based on structural considerations (presence of 2-ethylhexyl and cinnamaic moieties)	- Nominated for carcinogenicity studies; under review. Consult w/ FDA re: sunscreen preparations - Negative in *Salmonella*
1,1-Ethylidenebis(tryptophan) 132685-02-0	Private Individual 1997	Some people who used the dietary supplement L-tryptophan developed illnesses such as eosinophilia-myalgia syndrome (EMS). It was hypothesized that tryptophan microcontaminants such as 1,1-ethylidenebis(tryptophan) (EBT) and 3-phenylamino) alanine (PAA) were responsible for the reported illnesses. The nominator would like the NTP to test the tryptophan microcontaminants for carcinogenicity.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Fire-Trol PSF (Proprietary Mixture)	Chemonics Industries 1994	Fire-trol PSF fire retardant is one of the qualified products, but it was disqualified in 1993 because it contains a very small amount of thiourea. Insufficient data exists on this chemical mixture.	Nomination rejected because NTP will not test proprietary products. However, the program will consider testing individual component of the mixture if they are found to be of sufficient general interest. Before considering testing of this mixture or its components, the identity of the components and available Health and Safety information should be provided as well as use and exposure data.
Flea/Tick Pesticides Pyrethrin (584-79-2) Permethrin (52645-53-1) Precor (40596-69-8) Carbamate (302-11-4)	Private Individual 1995	Increase in use of these chemicals to eradicate fleas and ticks on dogs.	No testing - referred to EPA.
Flour Dust	United Auto Workers 1994	See Organic particulate	See Organic particulate
Fluasterone 112859-71-9	NCI 1998	The Chemoprevention Branch, Division of Cancer Prevention, NCI, planned to conduct phase II presurgical clinical trials to examine the effects of DHEA on breast and prostate lesions. However, there are concerns about several recent studies suggesting that DHEA may have carcinogenic potential. The Chemoprevention Branch is now focusing on a DHEA analog, Fluasterone, and will be conducting the clinical trials on Fluasterone instead of DHEA. As an approved chemopreventive drug, Fluasterone would have to undergo rigorous testing to demonstrate safety and efficacy, and the Chemoprevention Branch has asked the National Toxicology Program for assistance.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Folic acid 59-30-3	Private Individual 1994	Toxicologic effects of excess folate in humans	In review
Formaldehyde 50-00-0	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review - Prechronic inhalation completed - *In Vitro* Cytogenetics: Positive (Chromosome Aberrations); Positive (Sister Chromatid Exchanges) - *In Vitro* Cytogenetics: Positive (Chromosome Aberrations); Weakly Positive (Sister Chromatid Exchanges) - *Drosophila*: Positive (Sex-Linked Recessive Lethal); Negative (Reciprocal Translocation) - *Salmonella:* Positive (5 tests) - *Salmonella:* Weakly Positive (2 tests) - Conventional teratology completed
Freon 113 76-13-1	United Auto Workers 1994 Private Individual 1998	See Organic Solvents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Organic Solvents In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Fuel Additives (ETBE And TAME)	Health Effects Institute 1995	Use of ethers has increased and is expected to continue to increase with the introduction of reformulated gasoline in 1995. Increase in number of people exposed to ethers; lack of health effects information for ethers such as ETBE and TAME. Tests conducted under TSCA will involve only pure compound and possibly only a 90-day study. These two compounds should be tested alone and in combination with gasoline vapors using conventional cancer bioassay and other assays to determine the potential long-term effects of exposure.	Deferred 2-Methyl-2-ethoxypropane (ETBE) (637-92-3): - Negative in micronucleus assay - Negative in *Salmonella* tertiary-Amyl methyl ether (TAME) (994-05-8): - Negative in *Salmonella*
Fumonisin B1 116355-83-0	FDA 1991	Concern about adverse effects of fumonisins on animal health and potential toxic effects of fumonisin residues on humans consuming animals exposed to fumonisins; human exposure contaminated corn products.	- Prechronic dosed-feed study completed - Dosed-feed carcinogenicity study completed - Teratology study completed
2-Furancarboxylic acid 88-14-2	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Gasoline Exhaust Particulate	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, from acute and subacute testing in animals, or from inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	In review
	Private Individual 1998	The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels. Diesel particulate is clearly carcinogenic in rats. Parallel studies with gasoline engine exhaust particulate are lacking.	
Genistein 446-72-0	NIEHS 1996	See Endocrine Disrupter Project	See Endocrine Disrupter Project

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Ginkgolide B 15291-75-5	NCI 1998	Ginkgo biloba extract (GBE) and one of its active ingredients, ginkgolide B are nominated for their potential for widespread exposure through use as a dietary supplement used by the people eager to "improve brain functioning" or "promote radical scavenging activity." GBE and ginkgolide B have clearly demonstrated biological activity. GBE can be consumed in rather large doses for an extended period of time and some ingredients in GBE are known mutagens. In one case, a suspected high dose carcinogen, quercetin, is intentionally concentrated from the ginkgo leaf to manufacture the final product.	In review
Glutaraldehyde 111-30-8	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
Glycidamide 5694-00-8	Private Individual 1992	Glycidamide is a metabolic product of acrylamide, a known carcinogen in mice. From the perspective of the risk estimation of human exposure to acrylamide, it would be of great value if carcinogenicity testing could be performed ideally in the same strains of animals as acrylamide.	No additional testing - compound too difficult to procure and handle. - Dominant lethal (male), completed - Heritable translocation test, completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Glycolic acid 79-14-1	FDA 1997	The FDA is concerned about the health effects, especially the long-term health effects, from the use of skin care products containing alpha hydroxy acids (AHAs). These skin care products, used by millions of consumers, are marketed as cosmetics and therefore, product manufacturers have not demonstrated the safety and efficacy of the products prior to marketing. The FDA's preliminary assessment of data reviewed by the Cosmetic Ingredient Review raised several questions about the safety of these products.	Selected
Glycoluril 496-46-8	NCI 1997	Glycoluril's nomination is based on its potential for human exposures in the workplace and in the general population; lack of any toxicity data; and suspicion of carcinogenicity based on potential for nitrosation on one of the ring amino groups to form nitrosamides.	Deferred to obtain use, exposure, and health effects information
Glyoxal 107-22-2	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)
Goldenseal 84603-60-1	NIEHS 1998	The nomination of goldenseal and two of its constituent alkaloids is based on the potential for human exposure and the lack of chronic or carcinogenicity data.	Selected
Halazone 80-13-7	NIEHS 1988	- Potential for high consumer exposure - Water disinfectant - Lack of chronic toxicity data - Positive in *Salmonella*	- Positive in *Salmonella* - CEC and BSC recommended no testing based on limited exposure and lack of suspicion of toxicity

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Halogenated Aldehydes Class	AWWARF (American Water Works Association Research Foundation 1991	Wide exposure; Lack of adequate carcinogenicity testing	Under consideration with other water disinfection by-product chemicals
Halogenated Ethanes Class Study	NIEHS 1991	Study to examine class of halogenated ethanes	Hexachloroethane (67-72-1): - Two gavage carcinogenicity technical report published (TR-68 & TR-361 reports CE, MR MM FM; NE, FR) - Subchronic gavage study completed (Tox-45) - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Negative in *Salmonella* in two independent tests Pentachloroethane (76-01-7): - Gavage carcinogenicity technical report published (TR-232 reports CE, MM FM; EE, MR; NE, FR) - Subchronic gavage study completed (Tox-45) - Negative for chromosome aberrations - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* - Positive in mouse lymphoma - Negative in micronucleus assay - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Halogenated Ethanes Class Study (continued)			1,1,1-Trichloroethane (71-55-6): - Gavage carcinogenicity technical reports published (TR-3 & TR-262 reports IS) - Subchronic gavage study completed (Tox-45) - Prechronic microencapsulation in feed study In review - Chemical disposition completed - Mechanisms completed - Teratology completed - Positive for chromosomal aberrations and inconclusive for sister chromatid exchanges in Chinese hamster ovary cells - Negative and inconclusive in mouse lymphoma in two independent tests - Equivocal/negative in mouse lymphoma - Negative in *Salmonella* in four independent tests 1,1,1,2-Tetrachloroethane (630-20-6): - Gavage carcinogenicity technical report published (TR-237 reports CE, MM FM; EE, MR; NE, FR) - Subchronic gavage study completed (Tox-45) - Positive for chromosome aberrations - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* - Negative in mouse lymphoma and positive in another study - Positive in micronucleus assay - Negative in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Halogenated Ethanes Class Study (continued)			1,1,2,2-Tetrachloroethane (79-34-5): - Gavage technical report published (TR-27 reports CE, MM FM; EE, MR; NE, FR) - Prechronic microencapsulation in feed study completed and in review - Prechronic gavage completed - Subchronic gavage study completed (Tox-45) - Teratology pilot study completed - Negative for chromosomal aberrations and negative for sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in Drosophila - Negative in mouse lymphoma - Positive in micronucleus assay - Negative in *Salmonella* in two independent tests 1,1,2,2-Tetrabromoethane (79-27-6): - Subchronic gavage study completed (Tox-45) - Chemical disposition completed - Metabolism completed - Negative in *Salmonella* 1,1,1,2-Tetrabromoethane (630-16-0): - Subchronic gavage study completed (Tox-45) - Weakly positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Halogenated Ethanes Class Study (continued)			1,1,1-Trichloro-2,2,2-trifluoroethane (354-58-5): - Subchronic gavage study completed (Tox-45) - *Salmonella* on test 1,2-Dichloro-1,1-difluoroethane (1649-08-7): - Subchronic gavage study completed (Tox-45) - *Salmonella* on test 1,2-Difluro-1,1,2,2-tetrachloroethane (76-12-0): - Subchronic gavage study completed (Tox-45) - Weakly positive in *Salmonella* Pentabromoethane (75-95-6): - Subchronic gavage study completed (Tox-45) - Negative in *Salmonella*
Halogenated Ketones Class	American Water Works Association Research Foundation 1991	Water disinfection by-product with wide exposure; Lack of adequate carcinogenicity testing.	Under consideration with other water disinfection byproduct chemicals
2,2′,4,4′,5,5′-Hexachlorobiphenyl (PCB 153) 35065-27-1	NIEHS/EPA 1995	See Dioxin Toxic Equivalence Factor Studies	See Dioxin Toxic Equivalence Factor Studies
Hexachloroethane 67-72-1	NIEHS	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
2,4-Hexadienal 142-83-6	NCI 1993	See Dienaldehydes	See Dienaldehydes

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Hexamethyldisilazane 999-97-3	Private Individual 1988 Private Individual 1990	- Used in semiconductor industry - Potential for worker exposure - Lack of chronic toxicity data - Used in semiconductor manufacturing processes and in photolithography operations - Potential for significant human exposure - Lack of toxicological data	No testing - originally selected for general toxicology studies - consequently withdrawn due to its high reactivity and the fact that it is a severe irritant - *In vitro* cytogenetics: negative for chromosomal aberrations (CA), no tested in sister chromatid exchanges (SCE) - Negative in *Salmonella*
n-Hexane 110-54-3	Private Individual 1991	Continuing interest to public health, as well as to potential mechanisms	Withdrawn by nominator. Industry-conducted inhalation study documents reviewed by NTP and determined that hexane has been adequately tested in rats and mice; therefore, there is no need for further testing. The nominator agrees with the adequate study and no need for further testing. - Prechronic inhalation toxicity technical report published (TOX-02) - Teratology completed - Dominant lethal completed - Neurotoxicity assessment completed - Negative for chromosomal aberrations and positive for Sister Chromatid Exchanges in Chinese hamster ovary cells - Negative in Micronucleus assay - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
1,6-Hexanediamine dihydrochloride 6055-52-3	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review - Subchronic Toxicity technical report via drinking water and inhalation completed (TOX-21, published 1993) - Micronucleus: Negative (Male); Negative (Female)
trans-2-Hexenal 6728-26-3	Private Individual 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Hydralazine hydrochloride 304-20-1	Private Individual 1997	Hydralazine hydrochloride is used in various antihypertensive drug formulations for which several million prescriptions are written annually. It is suspected of being a carcinogen based on mutagenicity data and positive mutagenicity and carcinogenicity data in animals for structurally related compounds. There is a lack of complete and adequate 2-year bioassay data for hydralazine hydrochloride.	In review
Hydrastine 118-08-1	NIEHS 1998	The nomination of goldenseal and two of its constituent alkaloids is based on the potential for human exposure and the lack of chronic or carcinogenicity data.	Selected

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Hydrazine 302-01-2	NASA, Lyndon B. Johnson Space Center 1991	Hydrazine, a propellant used for many Space Shuttle applications, has been clearly shown to cause nasal tumors in rats and possibly lung adenomas in mice; however, the concentrations at which those effects were observed is quite uncertain. A carefully conducted bioassay by inhalation would provide the quality of data necessary to set exposure levels for spacecraft as well as ground-based operations.	In review
[Hydrogen cyanide] Hydrocyanic acid (74-90-8)	Private Individual 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Hydrogen fluoride 7664-39-3	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically-based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No testing - lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. Do not currently have resources to test by acute inhalation.
Hydrogen sulfide and Sulfide Liberating Compounds	Private Individual 1996	Highly toxic chemical and no known antidote. Hydrogen sulfide is used in over 200 industries.	Hydrogen sulfide (7783-06-4): In review
Hydroquinone 123-31-9	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
5-(Hydroxymethyl)furfural (HMF) 67-47-0	NIEHS 1995	5-(Hydroxymethyl)furfural (HMF) is a thermal decomposition product of sucrose, and has been identified in a wide variety of heat processed foods. HMF has mutagenic and DNA strand breaking activity. HMF promotes the growth of the aberrant crypt foci in the colon of rats initiated with azoxymethane, and also induced the development of these colon cancer precursor lesions in rats. No long-term studies have been reported on HMF.	Selected - Subchronic gavage; in review - Chemical disposition on test
Hypericin 548-04-9	NCI 1998	St. John's Wort is nominated based on its increasingly popular use as a readily available self-medication for depression. It is also widely used to promote the healing of wounds. Of particular concern are its uses for self-treatment of life threatening AID's related diseases and, in young children, to prevent bed wetting. St. John's Wort was nominated for carcinogenicity studies. Hypericin may be the active ingredient in St. John's Wort.	Deferred - pending NTP evaluation of industry carcinogenicity testing
Imidacloprid 138261-41-3	Texas Dept. Of Health 1995	Imidacloprid is a new pesticide that is expected to have widespread home and commercial use.	In review. Information has been requested from the EPA regarding this pesticide. The EPA requires industry to perform extensive testing for health effects and to submit the test data for evaluation before permitting the pesticide to be used. Although the NTP will not be doing testing that will duplicate EPA testing. Imidacloprid may be a candidate for NTP mechanistic or functional toxicology research.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Indole 120-72-9	NASA, Lyndon B. Johnson Space Center 1991	Spacecraft maximum allowable concentrations (SMACS) are required for indole as design criterion for the air revitalization system of the space station; toxicological database is limited; old studies indicate leukemogenic.	Request for additional information on exposure and populations at risk requested from nominator
Insect Repellent Class	Private Individual 1991	Widespread use by military in SE Asia, possible initiator of lupus and like conditions.	In review
Iodotrifluoromethane (CF_3I) 2314-97-8	Private Individual 1993	CF_3I is produced commercially and is used as an intermediate in organic synthesis. It is a fire-extinguishing agent being considered for use by the U.S. Air Force as a replacement for halon. No literature is present on the biological effects of the chemical. Computational methods and physical measurements done at Johns Hopkins predict that CF3I would be a potent hepatocarcinogen.	In review
Ipomeamarone 494-23-5	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Iron	Private Individual 1994	Common contaminant in ground water and drinking water, common food additive, and occupational hazard. Recent studies indicate serious health effects from excess iron. Increases the toxicity of dioxin by 100%.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Isoamyl acetate 123-92-2	NIEHS 1994 Private Individual 1996	Isoamyl acetate was nominated because of its high production, widespread use as a food additive (for flavor and fragrance), and use for fit-testing of respirators. Previously reported oral and SC studies of isoamyl acetate in Wistar rats indicated a possible carcinogenic response. See Naturally Occurring Chemicals in the Diet	No testing - Toxicokinetics, completed - Negative for sex-linked recessive lethal mutations in *Drosophila*; - Negative in *Salmonella* See Naturally Occurring Chemicals in the Diet
Isoamyl nitrite 110-46-3	NCI 1989	Used as a street drug - Potential for high human exposure - Lack of epidemiological data, and adequate toxicity studies in animals	- Nominated for carcinogenicity; under review - Weakly positive in *Salmonella* - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells
Isobutyl alcohol 78-83-1	Private Individual 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Isobutyl nitrite 542-56-3	NCI 1989	See n-Butyl nitrite	See n-Butyl nitrite
Triallyl isocyanurate 1025-15-6	NIEHS 1998	Triallyl isocyanurate, a commonly used crosslinking agent, was nominated for evaluation by NIEHS due to its moderate volatility, which enhances the potential for exposure and the lack of toxicity data. The principal concern with regard to human exposure is the potential release of allyl alcohol during the formulations of some rubber compounds, since conditions conducive to ester decomposition may exist during this time.	In review - *In Vitro* Cytogenetics: Negative (Chromosome Aberrations); Negative (Sister Chromatid Exchanges) - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Isocyanuric acid 108-80-5	NIEHS 1997	The nomination of isocyanuric acid is based on widespread exposure of the general population through use in formulation for common household cleaners, and for swimming pool disinfection.	No testing Negative in *Salmonella*
Isophorone 78-59-1	NIOSH 1990	- Potential for exposure of workers - Lack of epidemiological studies and animal inhalation toxicity data - Evidence of carcinogenicity in male mice and rats in a 2-year gavage study	- Nominated for inhalation studies - Previously tested by gavage route - No testing at this time - NTP Steering Committee requested that NIOSH re-evaluate NTP gavage study to determine if NTP could provide additional data to enable route-to-route extrapolation of the gavage study to inhalation exposure that would satisfy their needs. - Carcinogenicity gavage technical report published (TR-291 reports SE, MR; NE, FR; EE, MM; NE, FM) - Negative in *Salmonella* - Positive in mouse lymphoma - Negative for sex-linked recessive lethal mutations in *Drosophila* - Negative for chromosome aberrations- negative for sister chromatid exchanges - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells
Isopropenyl acetate 108-22-5	NCI 1995	Isopropenyl acetate (IPA) is an industrial petrochemical, which is used as a fragrance intermediate, a monomer for polymer manufacture, and a chemical intermediate. IPA is also under investigation for use in detergent formulations. The potential for human exposure is based on its use pattern.	No testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Isopropylamine 75-31-0	NIEHS 1997	The nomination for carcinogenicity testing is based on high production volume, ubiquitous natural occurrence, and lack of chronic study data.	No testing -- Reported inhalation studies indicate that IPA has irritant properties similar to those of TEA & DEA. - Negative in *Salmonella*
Kahweol 6894-43-5	Private Individual 1998	Cafestol, a diterpenoid compound in coffee, has the ability to raise cholesterol levels in humans and to activate the nuclear receptor FXR. While these functions might appear to be unlinked, an association has been established between the ability of some compounds to block isoprenoid synthesis and their anti-growth activities. It has been shown that compounds that induce FXR typically affect cholesterol levels and/or inhibit cell proliferation (Weinberger, unpublished results.) It has generally been observed that compounds having anti-carcinogenic activity exhibit FXR-inducing potential. And on the other hand, some carcinogens antagonize FXR-dependent transcription. For this reason, substances like cafestol that raise cholesterol levels are suspected FXR antagonists and thus "candidate" carcinogens.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Lactic acid 50-21-5	FDA 1997	The FDA is concerned about the health effects, especially the long-term health effects, from the use of skin care products containing alpha hydroxy acids (AHAs). These skin care products, used by millions of consumers, are marketed as cosmetics and therefore, product manufacturers have not demonstrated the safety and efficacy of the products prior to marketing. The FDA's preliminary assessment of data reviewed by the Cosmetic Ingredient Review raised several questions about the safety of these products.	Selected
Leucomalachite Green 129-73-7	FDA 1993	See Malachite Green	See Malachite Green
Lidocaine 137-58-6	NCI 1992	Widely used as local anesthetic and arrhythmic agent; significant human exposure; lack of carcinogenicity data.	No testing. Because it is used on a short-term basis, the amount of the drug to which humans are exposed is low and the metabolism data indicated that lidocaine is metabolized to 2,6-xylidine, a known animal carcinogen at low levels.
Linalool 78-70-6	NCI 1997	Linalool's nomination is based on high production volume, widespread human exposure, and an unknown potential for adverse health effects from long-term administration. Linalool is found in 63 different spices and it is a common flavoring in beverages and foods and has widespread use in cosmetics. Occupational exposure to linalool in the United States is significant, estimated to be over 250,000 workers in 106 industries.	Deferred - pending results from citral and beta-myrcene studies.
Lindane 58-89-9	University of Cincinnati 1994	See Pesticides and Herbicides	See Pesticides and Herbicides

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
alpha-Lipoic acid 1077-28-7	Private Individual 1998	None given	In review
Local Anesthetic Compounds	Private Individual 1994	Local anesthetic compounds that are of concern because of their hydrolysis products and produce aniline through metabolic conversion need to be evaluated long term.	Acetaminophen (4-Hydroxyacetanilide) (103-90-2): - No additional testing - Dosed feed carcinogenicity technical report published (TR-394 reports MR, NE; FR, EE; MM, NE; FM, NE) - Continuous breeding completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative in *Salmonella* Metronidazole (443-48-1): - Positive in *Salmonella* - IARC has classified as a Group 2B carcinogen – sufficient information available; it will not be considered for testing by NTP Lidocaine (137-58-6): - No testing because it is used on a short-term basis, the amount of the drug to which humans are exposed is low and the metabolism data indicated that Lidocaine is metabolized to a known animal carcinogen at low levels. Mepivicaine (96-88-8): - Mepivicaine and Buvicaine are metabolized to 2,6-dimethylaniline (2,6-xylidine) similar to Lidocaine--no testing based on low exposure & short-term use.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Local Anesthetic Compounds (continued)			Buvicaine (2108-82-9): - Mepivicaine and Buvicaine are metabolized to 2,6-dimethylaniline (2,6-xylidine) similar to Lidocaine--no testing based on low exposure & short-term use. Prilocaine (721-50-6): - Prilocaine is metabolized to *o*-toluidine (a known rodent carcinogen). No testing based on low exposure and short-term use. Procaine (59-46-1): - No testing planned Propoxycaine (550-83-4): - No testing planned Benzocaine (94-09-7): - No testing planned Cocaine (50-36-2): - No testing planned Articaine (23964-58-1): - No testing planned

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Luminol 521-31-3	Private Individual 1996 Private Individual 1997	Luminol is used as a forensic tool for locating trace blood residues at the crime scene. Criminal investigators as well as those who might inhabit the crime scene are exposed to this chemical. However, there is little known about the toxicological effects of luminol. A major concern is that luminol is applied as an aerosol in a mixture with sodium perborate, sodium carbonate, and distilled water. A review of the literature reveals insufficient testing to determine luminol's safety.	Selected Negative in *Salmonella*
Malachite Green 569-64-2	FDA 1993	Malachite green is used as an antibacterial and anti-fungal agent, as a dye for cloth and leather, as a histological stain, as an intestinal anti-helmintic, and as a wound disinfectant. It is considered by many in the industry as the most efficacious agent for combating fungal infections in aquatic species. Because of its effectiveness, this chemical is considered to have a high probability of abuse. There is an especially strong potential for diversion from domestic nonfood fish use to the food fish arena. Because of the various modes of administration, the use of this product could result in significant worker exposure and the effluent from the aqua-culture facilities could enter the water supply resulting in exposure of the general public through recreational activities and drinking water. Finally, the use of malachite green in food fish could result in human consumption of malachite green residues.	Malachite green (569-64-2) - Dosed-feed repeated dose completed; - Negative in micronucleus assay - Negative in *Salmonella* Malachite green oxalate (2437-29-8): - Negative in *Salmonella* Leucomalachite green (129-73-7): - Repeated dose feed completed
Malachite Green oxalate 2437-29-8	FDA 1993	See Malachite Green.	See Malachite Green

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Malathion 121-75-5	Private Individual 1994	See Pesticides	See Pesticides
Maleic Anhydride 108-31-6	State of California EPA (OEHHA) 1995	A component in facility chemical emissions that lacks acute exposure data.	No testing - no resources to do acute inhalation testing; many anhydrides already tested - Negative in *Salmonella*
Marijuana Smoke 8063-14-7	Private Individual 1996	There are critical issues regarding marijuana's impact on public health that remain highly controversial. One of these is the carcinogenic potential of marijuana smoke. There are numerous reports of a higher than expected incidence of lung cancer in young individuals.	In review
MBT (2-Mercaptobenzothiazole) 149-30-4	Private Individual 1994	MBT (2-Mercaptobenzothiazole) is a chemical used in formulation of retardants for many years. The pesticide regulations in California leave it off the list of chemicals because it is very likely to disappear from pesticide applications. No evidence available from animal testing.	No additional testing. Extensively tested by NTP. Tested for toxicity and carcinogenicity in rats and mice in oral gavage 16-day, 13-week, and 2-year studies (TR-332). - Gavage carcinogenicity technical report published (TR-332 reports SE, MR FR; NE, MM; EE, FM) - Immunotoxicity completed - Positive in mouse lymphoma - Negative in micronucleus assay - Inconclusive in *Salmonella* assay and negative in another independent test - Positive for chromosomal aberrations in Chinese hamster ovary cells; not tested in sister chromatid exchanges - Positive for sister chromatid exchanges in Chinese hamster ovary cells; not tested for chromosomal aberrations

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Medicinal Herbs	Private Individual 1997	Coltsfoot, senecio, chaparral, germander and cat's claw were nominated for study based on their current use patterns in the United States and that they may contain toxic ingredients.	In review
Melatonin 73-31-4	NIEHS 1996	Melatonin, a hormone produced by the pineal gland, has become very popular as an over-the-counter hormone supplement as well as being used as a chemotherapeutic agent in cancer. A literature search reveals a lack of toxicity studies. In addition, it has been suggested that melatonin may have the potential to cause ocular toxicity.	Selected for limited short-term testing with emphasis on ocular toxicity. - Selected for toxicity - Toxicokinetic study, on test - Teratology pilot study, completed - Conventional teratology, completed - Continuous breeding, selected
Menthofuran 494-90-6	NIEHS 1998	The nomination of pulegone and menthofuran for testing is based on the potential for human exposure and the absence of carcinogenicity data. Pulegone is a major constituent of pennyroyal and menthofuran is one of the metabolites of pulegone.	Selected
Menthyl anthranilate 134-09-8	NCI 1990	- Nomination resulted from a class study of sunscreen ingredients - Used in many combination products - Potential for human exposure - Lack of toxicity data	- Nominated for carcinogenicity studies; under review - Consult w/ FDA re: sunscreen preparations
Mepivicaine 96-88-8	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Metals	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, from acute and subacute testing in animals, or from inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	Welding fume (copper, zinc, lead oxide) Consult NIOSH/NIEHS on toxicity evaluation of complex industrial exposures Cobalt dust The NTP completed a 2-year inhalation study of cobalt sulfate heptahydrate (TR-471). No further carcinogenicity studies using cobalt are anticipated.
Methanol 67-56-1	EPA 1989 Private Individual 1991	Methanol is being developed as an alternative fuel for vehicles - Potential for significant human exposure Data needed to determine the toxicity of methanol at low environmental levels of exposure and to evaluate health effects. Several chemicals with extremely large production amounts and numbers of people exposed should be evaluated for both short and long term adverse effects.	No additional testing - Mechanisms completed - Metabolism completed - Teratology completed - Inconclusive in *Salmonella*
Methoxychlor 72-43-5	NIEHS 1994 NIEHS 1996	See Pesticides and Kids See Endocrine Disrupter Project	See Pesticides and Kids See Endocrine Disrupter Project

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Methyl bromide 74-83-9	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No additional testing to be performed - Prechronic inhalation completed - Inhalation carcinogenicity technical report published (TR-385 reports NE, MM FM) - Chemical disposition completed - Toxicokinetic study, completed - Neurotoxicology assessment, completed - Teratology completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in *Salmonella*
Methyl ethyl ketone peroxide 1338-23-4	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review Short-Term Toxicity topical technical report (TOX-18 published 1993) - *In vitro* Cytogenetics: Positive (Chromosome Aberrations); Positive (Sister Chromatid Exchanges) - Mouse Lymphoma: Positive - Micronucleus: Negative (Male); Negative (Female) - *Salmonella*: Negative; Positive
Methyl glyoxal 78-98-8	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Methyl styryl ketone 122-57-6	NCI 1994	Methyl styryl ketone (MSK) was nominated when a positive result was reported in the Ames assay in strain TA100 with S-9 activation. MSK is an alpha, beta-unsaturated ketone, selected because of its multiplicity of producers/suppliers and industrial uses, human exposure as a synthetic flavoring agent and additive to tobacco during cigarette manufacture, and reactivity in biological systems. Use in fragrances may mean exposure through use of soaps in addition to its use as a food additive.	No testing - Negative in micronucleus assay - Positive in *Salmonella* Methyl *trans*-styryl ketone (1896-62-4): - Selected for toxicity/carcinogenicity - Chemical disposition completed
Methyl *tert*-butyl ether 1634-04-4	NIOSH 1990 State of Alaska Dept of Health & Social Services 1994	- Potential for worker and consumer exposure - Lack of animal toxicity data - Adverse health effects; Deficiency in existing database for MTBE; Great potential for human exposure.	Because of its interest in MTBE, the U.S. EPA entered into a consent agreement with industry to have manufacturers perform testing. As a result of this action, the NTP put its testing plans on hold. - Negative in micronucleus assay - Negative in *Salmonella*
Methyl vinyl ketone 78-94-4	NCI 1992	Commercially important synthetic intermediate; interest in toxicity of alpha, beta-unsaturated ketones chemical class; suspicion of carcinogenicity	- Subchronic inhalation completed; - Positive in *Salmonella*
3-Methyl-1,2-benzenediol 488-17-5	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
2-Methyl-2-ethoxypropane (ETBE) 637-92-3	Health Effects Institute 1995	See Fuel additives	See Fuel additives

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Methylal 109-87-5	NCI 1997	Methylal's nomination is based on: 1) its potential for occupational exposures based on high production volume (1.2-64 million lbs) and estimate of worker exposure; 2) evidence of occupational exposures based on TLV and other literature documentation; 3) potential for general population exposures based on use as a solvent in consumer products and occurrence in environmental media; 4) suspicion of carcinogenicity based on potential for metabolic release of formaldehyde and positive mutagenicity data; and 5) lack of chronic toxicity data.	Deferred by ICCEC pending receipt of production, use, exposure, & health effects data
Methylamine 74-89-5	Private Individuals 1996 NCI 1996	See Naturally Occurring Chemicals in the Diet The nomination of methylamine is based on its potential for occupational and consumer exposure, and suspicion of carcinogenicity. The chemical has a high production volume and is present in many consumer products and the environment. Consumer exposure results from consumption of foods and beverages containing methylamine or substances that are metabolized to methylamine. The suspicion of carcinogenicity is based on genotoxicity data and the potential for the conversion of methylamine into nitrosamines.	See Naturally Occurring Chemicals in the Diet In review - Positive in mouse lymphoma - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Methylene Blue 61-73-4; 7220-79-3	NCI 1989	- Widely used dye; e.g., it is used to treat manic depressives and to counteract nitrate poisoning - High potential for human and animal exposure - Lack of adequate toxicity data	Methylene Blue (61-73-4): No testing Methylene Blue Trihydrate (7220-79-3) - Prechronic gavage studies completed - Carcinogenicity gavage study selected Toxicokinetics on test - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative micronucleus - Positive in *Salmonella* - Teratology completed
4-Methylimidazole 822-36-6	NCI-CSWG 1991	Widespread use; potential for widespread exposure to humans in food products; lack of chronic toxicity data; suspicion of carcinogenicity	- Prechronic dosed-feed study completed - Dosed-feed carcinogenicity study on test - Chemical disposition completed - Negative in micronucleus assay - Negative in *Salmonella* in two independent tests.
Methylolurea 1000-82-4	NIEHS 1998	The nomination of the methylolurea class compounds by the NIEHS for testing is based on high production volumes (including urea-formaldehyde resins which contain methylolurea or dimethylolurea as impurities), the potential for human exposure, and the lack of data on carcinogenicity.	Deferred
N-Methylpyrrolidone (*N*-methyl-α-pyrrolidinone) 872-50-4	a) Private Individual b) NIEHS c) CPSC 1988	- High production volume - Worker exposure - Used in semi-conductor industry - Potential for increased use as a solvent - Lack of chronic toxicity data	- Referred to EPA for industry testing under TSCA Section 4(e) test rule - Chemical disposition completed - Metabolism completed - Negative in *Salmonella* in two tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Metronidazole 443-48-1	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Mineral Oil 8012-95-1	United Auto Workers 1994 Private Individual 1998	See Machining fluid constituents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Machining fluid constituents In review
Mineral Particulate	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, from acute and subacute testing in animals, or from inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	Talc (14807-96-6): - Inhalation carcinogenicity technical report published (TR-421 reports CE, FR; SE, MR; NE, MM FM) NIOSH assistance requested in evaluating nomination from the standpoint of occupational exposure.
Monoethanolamine (Ethanolamine) 141-43-5	Private Individual 1991	Widely used in cosmetic preparations and other commercial products; intermediate in synthesis of phospholipids; caused toxic responses at multiple organ sites in prechronic studies.	No further testing of monoethanolamine - Short-term *in vivo* reproductive toxicity completed; - Teratology pilot studies completed; - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Myristicin 607-91-0	NCI 1997	Myristicin's nomination is based on its potential for widespread human exposure through foods and beverages and the possibility of adverse effects in diverse populations. Myristicin is the hallucinogenic agent in nutmeg and mace. Myristicin may have the potential to be both a carcinogen and an anti-carcinogen. It may have the ability to inhibit liver tumor formation in mice exposed to carbon tetrachloride. However, myristicin is closely related to safrole, a liver carcinogen in mice and rats.	Selected
1-Naphthylamine 134-32-7	Private Individual 1991	Large volume chemical to which the human population received relentless and uninformed exposures. Continuing interest to public health as well as to mechanisms. (Part of a priority list of chemicals compiled by DTRT/NIEHS).	In review for further testing consideration. - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Naturally Occurring Chemicals In The Diet	Private Individuals 1996	One of 22 substances nominated as naturally occurring chemicals in the diet. Since naturally occurring chemicals in the diet have not been a focus of research, it seems reasonable to investigate some of them further as possible hazards because they often occur at high concentrations in foods. In addition, since regulatory agencies are considering a change in the standard protocol from *ad libitum* feeding to dietary restriction, it is important to know what impact that change will have on carcinogenicity sensitivity. It is suggested that NTP conduct bioassays on a small group of model compounds using both *ad libitum* and dietary restriction protocols with multiple dose groups and inclusion of studies on cell division. A comparison of results would address the issue of positivity and mechanism.	Caffeine (58-08-2): In review - Dosed-water, completed prechronic - Continuous breeding, completed - Teratology, completed - Negative in *Salmonella* in two independent tests alpha-Chaconine (20562-03-2): Defer testing pending results of alpha-solanin testing Chlorogenic acid (327-97-9): In review *p*-Coumaric Acid (7400-08-0): In review Epicatechin (490-46-0): In review Ethyl acetate (141-78-6): In review - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Naturally Occurring Chemicals In The Diet (continued)			2-Furancarboxylic acid (88-14-2): In review trans-2-Hexenal (6728-26-3): In review [Hydrogen cyanide] Hydrocyanic acid (74-90-8): In review Ipomeamarone (494-23-5): In review Isoamyl alcohol (123-51-3): In review Isobutyl alcohol (78-83-1): In review - Negative in *Salmonella* Methylamine (74-89-5): In review - Positive in mouse lymphoma - Negative in *Salmonella* 3-Methyl-1,2-benzenediol (488-17-5): In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Naturally Occurring Chemicals In The Diet (continued)			Oxalic acid (144-62-7): In review - Subchronic dosed-feed study - chronic study withdrawn prior to testing because no evidence of subchronic toxicity - Continuous breeding, completed - Negative in *Salmonella* Phenethyl alcohol (60-12-8): No testing—no suspicion for carcinogenesis based on structure and genetic toxicity tests Piperine (7780-20-3): In review Propyl alcohol (71-23-8): In review - Teratology completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Naturally Occurring Chemicals In The Diet (continued)			Pyrogallol (87-66-1): In review alpha-Solanine (20562-02-1): Selected for carcinogenicity/toxicity studies Theobromine (83-67-0): In review - Continuous breeding, completed - Negative in *Salmonella* - TRC, selected Trigonelline (535-83-1): In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Nickel Salts (Soluble And Insoluble)	Department of Health Services, Health and Welfare Agency, State of California 1990	- Need for studies to ascertain the carcinogenic potential of nickel compounds by the oral route - Need dose-response data for low dose extrapolation to establish health-based exposure criteria for humans environmentally exposed to nickel	- NTP toxicology studies of nickel and several nickel compounds (soluble and insoluble) already in progress Nickel sulfate hexahydrate (10101-97-0): - Subchronic inhalation completed - Inhalation carcinogenicity technical report published (TR-454 reports NE, MR; NE, FR; NE, MM; NE, FM): - Positive in mouse lymphoma - Negative in *Salmonella* Nickel subsulfide (12035-72-2): - Subchronic inhalation completed - Inhalation carcinogenicity technical report published (TR-453 reports CE, MR; CE, FR; NE, MM; NE, FM) - Negative micronucleus male/female - Inconclusive in *Salmonella* Nickel (II) oxide (1313-99-1): - Subchronic inhalation completed - Inhalation carcinogenicity technical report published (TR-451 reports SE, MR; SE, FR; NE, MM; EE, FM) - Negative micronucleus male/female - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
5-Nitroindazole 5401-94-5	NCI 1994	5-Nitroindazole (5-NI) is an important photographic chemical that appears to be growing in use. It is also the subject chemical in a number of recent patents in chemical processing and related industries. Some evidence of mutagenic activity has been reported, including positive Ames results. Many nitrogen-containing heterocyclics and nitroaromatics have shown biological activity and some have shown an association with carcinogenicity in animals. Testing of this organic compound will help fill gaps in knowledge of the potential chronic health effects of components of photographic chemical mixtures.	Although there is a lack of toxicity data, it was not recommended for testing due to the lack of evidence of significant human exposure.
4-(N-Nitroso-N-Methylamino)-1-(3-Pyridyl)-1-Butanone 64091-91-4	United Auto Workers 1994	See Tobacco-specific N-nitrosamines	See Tobacco-specific N-nitrosamines
Non-Ionizing Surfactants	United Auto Workers 1994 Private Individual 1998	See Machining Fluid Constituents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Machining Fluid Constituents In review
Nonylphenol 104-40-5	NIEHS 1996	See Endocrine Disrupter Project	See Endocrine Disrupter Project

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Octachloronaphthalene 2234-13-1	NCI 1996	Octachloronaphthalene (OCN) is nominated for an estrogenic activity screen and induction of p450 studies. The nomination is based on the potential for bioaccumulation, former production, widespread exposure, and inadvertent formation from inceration of products containing OCN. Although OCN is not currently produced and was never intentionally produced commercially as a pure compound, it was present as a component of various polychorinated naphthalene products (halowaxes). These compounds were widely used in electrical insulation, fire resistant material, water repellents, wood preservatives, and lubricants.	Withdrawal pending response from NCI recommendation to replace octachloronaphthalene with PCN 66 & 67
1-Octene 111-66-0	NIEHS 1995	alpha-Olefins are used as monomers in the plastics industry and as starting materials for other products. 1-Octene is a high production volume member of this class that has the potential for human exposure in industry, but no data were found to adequately assess toxicity and carcinogenicity.	No testing. As a result of OECD activities and the presumed limited exposure to the chemical, the ICCEC recommended that 1-octene not be tested by the NTP - Negative in *Salmonella*
Omeprazole 73590-58-6	Private Individual 1991	Investigate the genotoxic and/or cell proliferative events of this potent gastric acid inhibitor, which produces gastric carcinoids of endocrine cell origin; wide use in humans as an anti-ulcer drug.	No testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Organic Particulate	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, from acute and subacute testing in animals, or from inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for a more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	NIOSH assistance requested in evaluating nomination from the standpoint of occupational exposure. Wood dust As a result of extensive human data and IARC's classification as a human carcinogen by inhalation, NTP has decided not to test in rodents. Referred to NIOSH/NIEHS for toxicity evaluation of complex industrial exposures. Flour dust NIOSH and NIEHS may help the NTP decide which of a list of complex substances and mixtures to select for study as well as which aspects of these occupational exposures are most important to study.
Organic Solvents	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, from acute and subacute testing in animals, or from inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	Trichloroethylene (79-01-6): No additional testing - IARC accepted rat studies - Three gavage technical reports published (TR-002, TR-243, TR-273 report NE, MR FR; CE, MM FM) - Dosed feed pre-chronic repeated dose and gavage completed - Toxicokinetics completed - Immunotoxicity, completed - Immunotoxicity report in preparation - Continuous breeding completed - Negative for chromosome aberrations - Positive for chromosomal aberrations and negative for sister chromosome exchanges in Chinese hamster ovary cells

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Organic Solvents (continued)			- Inconclusive for sex-linked recessive lethal mutations in *Drosophila*; - Positive in mouse lymphoma - Negative in micronucleus assay - Negative in *Salmonella* in two independent tests - Negative for sister chromatid exchanges 1,1,1-Trichloroethane (Methyl chloroform) (71-55-6): No testing. EPA has required reduced production with a complete phase-out of manufacturing by Jan. 1996 due to the depletion of the ozone layer. - Gavage technical report published (TR-003; IS, MR FR MM FM) - Microencapsulation in feed toxicity report in preparation - Chemical disposition completed - Mechanisms completed - Teratology completed - Positive for chromosomal aberrations and inconclusive for sister chromatid exchanges in Chinese hamster ovary cells - Negative in mouse lymphoma; inconclusive in mouse lymphoma in another test - Equivocal in male and negative in female micronucleus assay - Negative in *Salmonella* in four independent tests Stoddard solvent (8052-41-3) - Negative in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Organic Solvents (continued)			Stoddard Solvent Type IIC selected for testing (CAS: 64742-88-7): - Completed, subchronic inhalation - Selected for toxicity/carcinogenicity Freon 113 (76-13-1): In review
Orthanilic acid 88-21-1	NIEHS 1997	The nomination of orthanilic acid is based on the limited amount of toxicological information available for this chemical.	No testing - ICCEC - based on low production and limited exposure - Weakly positive in *Salmonella*
Oxalic acid 144-62-7	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet.	See Naturally Occurring Chemicals in the Diet.
10,10n-Oxydiphenoxarsine 58-36-6	Private Individual 1996	This chemical is an additive in plastics. The nominator thinks that there could be a relationship between the chemical's structure and its potential carcinogenicity.	NTP has requested additional information from the nominator
Paint Dust	United Auto Workers 1994	See Synthetic Polymer Process Emissions	See Synthetic Polymer Process Emissions
Paint Mist Solids	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review
Parathion 56-38-2	Private Individual 1994 NIEHS 1994	See Pesticides and Kids	See Pesticides and Kids

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
PCB 126 57465-28-8	NIEHS/EPA 1995	See Dioxin Toxic Equivalence Factor Studies	See Dioxin Toxic Equivalence Factor Studies
2,2',4,4',5-Pentabromodiphenyl ether 60348-60-9	Private Individual 1998	Polybrominated diphenyl ethers were nominated based on their bioaccumulative properties, the ongoing production of PBDEs, and the possibility for widespread human exposure through the food chain. There is a lack of subchronic and chronic toxicity information and a suspicion of neuro-developmental toxicity. Studies in rodents have shown hyperplasia of the thyroid and a decrease in circulating thyroid hormone levels after exposure to technical mixtures of PBDEs.	In review
Pentabromoethane 75-95-6	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
Pentachlorodibenzofuran 57117-31-4	NIEHS/EPA 1995	See Dioxin Toxic Equivalence Factor Studies	See Dioxin Toxic Equivalence Factor Studies
Pentachlorodibenzo-P-dioxin 40321-76-4	NIEHS/EPA 1995	See Dioxin Toxic Equivalence Factor Studies	See Dioxin Toxic Equivalence Factor Studies
Pentachloroethane 76-01-7	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
N-Pentanal (Valeraldehyde) 110-62-3	NCI 1997	Valeraldehyde's nomination is based on: 1) potential for occupational exposures based on high production volume (25-100 million lbs) and estimate of worker exposure; 2) evidence of occupational exposures based on TLV and other literature documentation; 3) universal potential for general population exposures based on endogenous and exogenous occurrence in many consumed products and in environmental media; 4) suspicion of carcinogenicity based on short-term test results and aldehyde structure; and 5) lack of chronic toxicity data.	In review - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Perchloromethyl mercaptan (594-42-3)	NIEHS 1988	- High production volume - Worker exposure - Lack of chronic toxicity data - Structural interest	- Nominated for carcinogenicity studies; - No testing - refer to ITC - Positive in *Salmonella*
Perfluorinated Compounds	Private Individual 1990	Determine carcinogenicity potential of perfluorinated compounds - Perfluorinated compounds are potent peroxisome proliferators and were found to induce 8-hydroxydeoxyguanosine in the livers of treated rats	- Nominated for carcinogenicity studies; under review. In addition NTP has performed prechronic studies on the following peroxisome proliferators: Dibutyl Phthalate (Peroxisome Project) (84-74-2) Gemfibrozil (Peroxisome Project) (25812-30-0) 2,4- Dichlorophenoxyacetic Acid (Peroxisome Project) (94-75-7) WY-14643 (Peroxisome Project) (50892-23-4) Perfluorodecanoic acid (335-76-2): - Mechanisms completed - Conventional teratology completed Perfluorooctanoic Acid (335-67-1): - Cell proliferation completed
Perfluorodecanoic acid 335-76-2	Private Individual 1990	See Perfluorinated Compounds	See Perfluorinated Compounds
Perfluorooctanoic acid 335-67-1	Private Individual 1990	See Perfluorinated Compounds	See Perfluorinated Compounds

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Pesticides	Private Individual 1994	Investigation of the relationship between pesticides and breast cancer, the link between pesticides and lowered sperm counts, and the feminization of bird/fish/mammal species. Taking patient histories as a family practitioner has provided convincing evidence that the increase in breast cancer is directly related to the proliferation and widespread use of pesticides and herbicides in the U.S.	These pesticides are regulated by EPA under (FIFRA). There is extensive data on carcinogenicity and *"in vitro"* testing. As a consequence of the testing that has already been performed, or is ongoing on these pesticides, and the authority of the EPA to require testing by the registrants, it is unlikely that the NTP will be performing any additional carcinogenicity testing on these pesticides. Dichlorodiphenyltrichloroethane (DDT) (50-29-3): - Dosed-feed carcinogenicity technical report published (TR-131 reports NE, MR FR MM FM) - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative in mouse lymphoma - Negative in *Salmonella* Malathion (121-75-5): - Two carcinogenicity dose-feed technical reports published (TR-24 & TR-192 report NE, MR FR MM FM) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Inconclusive in mouse lymphoma - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Pesticides (continued)			Parathion (56-38-2): - Dosed feed carcinogenicity technical report published (TR-70 reports EE, MR FR; NE, MM FM) - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Weakly positive in *Salmonella* in one test and negative in another
Pesticides and Herbicides	University of Cincinnati 1994	Recommended research be done on the potential carcinogenic effects of pesticides and herbicides. There is enough circumstantial evidence now to put new suspicion on these chemicals. Citing the Israeli experience of reducing the level of pesticides in dairy products and the subsequent decrease in breast cancer and also the rising rate of cancer among American farmers as reason to evaluate these chemicals. There are areas of the country where these chemicals are used on a monthly basis to control pests, not to mention the numerous lawn treatments that people are using with regards to herbicides.	These chemicals are regulated by the EPA via FIFRA. There have been extensive rodent carcinogenesis and *in vivo* mutagenicity studies by various organizations which have yielded a variety of positive and negative results. The results of most testing has been published with the remainder to follow. As a consequence of the testing, it is unlikely that NTP will perform any additional testing. Dichlorodiphenyltrichloroethane (DDT) (50-29-3): - Carcinogenicity dosed-feed technical report published (TR-131 reports NE, MR FR MM FM) - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative in mouse lymphoma - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Pesticides and Herbicides (continued)			p,p′-Dichlorodiphenoldichloroethylene (72-55-9): - Carcinogenicity dosed-feed technical report published (TR-131 reports NE, MR FR MM FM) - Negative for chromosomal aberrations and weakly positive for sister chromatid exchanges in Chinese hamster ovary cells - Positive for sex-linked recessive lethal and negative for recessive lethal mutations in *Drosophila* - Positive in mouse lymphoma - Negative in *Salmonella* in two independent tests Lindane (58-89-9): - Carcinogenicity dosed-feed technical report published (TR-14 reports NE, MR FR MM FM) - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Inconclusive in mouse lymphoma - Negative in *Salmonella*
Pesticides and Kids	NIEHS 1994	A recent NAS report ("Pesticides in the Diets of Infants and Children") raised the issue that regulators and public health scientists know nothing about the long-term effects of perinatal exposure to toxicants. This report called for a significant research effort into the potential effects of neonatal exposure to pesticides.	Trichlorfon (52-68-6): - Prechronic dosed-feed completed - Neurotoxicity assessment completed - Total reproductive capacity, completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in mouse lymphoma - Negative in micronucleus assay - Weakly positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Pesticides and Kids (continued)			Parathion (56-38-2): - Carcinogenicity dosed feed technical report published (TR-70 reports EE, MR FR; NE, MM FM) - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Weakly positive in *Salmonella*, negative in *Salmonella* in an independent test Kid Pest Project (Carbaryl) (63-25-2): - Juvenile pesticide assessment, completed Atrazine (1912-24-9): - Immunotoxicity completed - Negative in *Salmonella* Chlorpyrifos (Dursban) (2921-88-2): - Toxicokinetics, completed - Immunotoxicity, completed - Juvenile pesticide assessment, completed - *Salmonella*, selected Kid pest project (Methoxychlor) (72-43-5): - Juvenile pesticide assessment, completed
Petroleum Sulfonates 61789-85-3	United Auto Workers 1994 Private Individual 1998	See Machining Fluid Constituents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Machining Fluid Constituents In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Phenethyl alcohol 60-12-8	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Phenol 108-95-2	Private Individual 1991	Continuing interest to public health as well as to potential mechanisms. Large volume chemicals to which the human population received relentless and uninformed exposures. Because most chemicals in commerce have not been evaluated for biological or toxicological effects (NAS, 1984), several chemicals with extremely large production amounts and immense numbers of people being exposed should be evaluated for both short-term and long-term potential adverse effects. Continuing interest to public health as well as to mechanisms. (Part of a priority list of chemicals compiled by DTRT).	Limited resources will not permit further testing of this compound. - Carcinogenicity dosed water technical report published (TR-203 reports NE, MR FR MM FM) - Teratology completed - Total reproductive capacity completed - Positive in Mouse Lymphoma - Positive in Micronucleus assay - Negative in *Salmonella* in two independent tests - Negative for sex-linked recessive lethal mutations in *Drosophila* - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive for sister chromatid exchanges in one study and negative in another - Positive for chromosomal aberrations in two independent studies
Phenol-Formaldehyde Resin Dust 9003-35-4	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Phenothiazine 92-84-2	NIEHS 1997	The nomination of phenothiazine is based on high production volumes and limited toxicological information. It is extensively used as a veterinary insecticide and antihelmintic in farm animals, but not humans or companion animals. (Zeneca, 11/19/97, indicated phenothiazine's current use is in industrial applications; no longer used for veterinary and agricultural applications.) Several phenothiazine-derivative psychopharmacological agents are marketed in the U.S. including chlorpromazine (Thorazine). It is not currently registered under FIFRA as a pesticide, but its veterinary use has been grandfathered in. Phenothiazine is a photosensitizer in humans following oral administration. Oral consumption of high doses by humans has been reported to cause a number of effects including hemolytic anemia, toxic hepatitis, gastrointestinal and dermal irritation and kidney damage.	Withdrawn - Negative in *Salmonella*
3-(Phenylamino)alanine 145545-23-9	Private Individual: 1997	Some people who used the dietary supplement L-tryptophan developed illnesses such as eosinophilia-myalgia syndrome (EMS). It was hypothesized that tryptophan microcontaminants such as 1,1-ethylidenebis (tryptophan) (EBT) and 3-phenylamino) alanine (PAA) were responsible for the reported illnesses. The nominator would like the NTP to test the tryptophan microcontaminants for carcinogenicity.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
4-Phenylcyclohexene 4994-16-5	Private Individual 1990	Byproduct formed during the manufacture of latex carpet backings - Chemical is suspected of off gassing after carpet installation - Suspect cause of "sick building syndrome"	- Nominated for prechronic and developmental studies; under review. NTP to contact EPA and CPSC to determine if any action had been taken by those agencies.
Phenylglyoxal 1074-12-0	NCI 1995	There is potential for phenylglyoxal exposure to humans based on its wide use as a reagent in industry, academia, & clinical labs. In addition, it was proposed to be used as an antimicrobial agent. It has been shown to be mutagenic. Phenylglyoxal is a member of the ketoaldehydes chemical class, which has not been adequately tested for carcinogenicity.	Testing deferred pending information from USDA and FDA regarding USDA safety assessment. - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Phosphine 7803-51-2	NCI 1989 NCI 1992	- High production - High worker exposure; phosphine is used as a fumigant in the grain industry; also used in the electronics industry Data needed to supplement and complement an EPA, NCI, and NIEHS collaborative five-year plus prospective study of pesticide applicators and spouses; phosphine is one of the chemicals to be investigated in this study. Renomination for carcinogenicity studies based on prediction of sharp increase in its use as a grain fumigant since EPA regulations now ban almost all other previously used grain fumigants; increased risk of developing non-Hodgkin's lymphoma; worker exposure.	- Prechronic (2-week) studies completed Negative micronucleus (non-standard protocol) No additional testing - phosphine is unstable and decomposes readily; exact nature of decomposition products to which humans are exposed is not known; generation of pure test material would be difficult in animal studies. Epidemiological study of workers in the grain handling industry is planned which will examine the issue of phosphine toxicity. Previously NTP Board determined no testing to be done because phosphine is unstable and decomposes readily; exact nature of decomposition products to which humans are exposed is not known; generation of pure test material would be difficult in animal studies. NCI and EPA are collaborating on an epidemiological study of workers in the grain handling industry, which will examine the issue of phosphine toxicity.
Photographic Fixers & Developers	Private Individual 1991	Determine health effects of group of chemicals to which workers in photographic and radiologic industries are exposed.	Individual compounds In review for further testing. Glutaraldehyde (111-30-8): - Prechronic Inhalation toxicity technical report published (TOX-25) - Inhalation carcinogenicity study completed - Positive for chromosomal aberrations - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Photographic Fixers & Developers (continued)			- Weakly positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* in two tests - Positive in mouse lymphoma - Equivocal in micronucleus assay - Negative in two other micronucleus assays - Inconclusive, weakly positive and positive in *Salmonella* in three independent tests Hydroquinone (123-31-9): - Gavage carcinogenicity technical report published (TR-366 reports SE, MR FR FM; NE, MM) - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Inconclusive for sex-linked recessive lethal mutations in *Drosophila* - Positive in mouse lymphoma - Positive in micronucleus assay - Negative in *Salmonella* Silver nitrate (7761-88-8): - Neurotoxicology assessment completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Photographic Fixers & Developers (continued)			Diethylene glycol (111-46-6): - Chemical disposition completed - Continuous Breeding completed - Short-term in vivo reproductive toxicology completed - Teratology completed - Negative in *Salmonella* Acetic acid (64-19-7): - Negative in *Salmonella* Potassium hydroxide (1310-58-3): - No testing Sodium acetate (127-09-3): - No testing Sodium borate (1303-96-4): - No testing Ammonium sulfate (10043-01-3): - No testing Aluminum sulfate (7783-20-2): - No testing
Piperine 7780-20-3	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Polybrominated Diphenyl Ethers (Mixture) --	Private Individual 1998	PBDE mixture or #46 and #99 were nominated for animal cancer bioassay. PBDE levels have been exponentially increasing in Sweden and PBDE congeners bioaccumulate.	In review - nominator requested to provide additional information on specific substances

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Polyester-Polystyrene Dust [In Combination With Fibrous Glass]	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review
Potassium hydroxide 1310-58-3	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
Powdered Root Of Goldenseal	NIEHS 1998	The nomination of goldenseal and two of its constituent alkaloids is based on the potential for human exposure and the lack of chronic or carcinogenicity data.	Selected
Power-Line Frequency Electric And Magnetic Fields	Electric Power Research Institute 1989	- Recent epidemiological studies weakly support an association between exposure to magnetic fields and the incidence of cancer in both residential and occupational environments. - Data from carcinogenicity studies needed to resolve public health concerns about the possible effects of electric and magnetic fields on human health	- Prechronic toxicity study via whole body exposure published (TOX-58) - Carcinogenicity study via whole body exposure published (TR-488) - Continuous breeding completed - Conventional teratology completed
Prednisone 53-03-2	NCI 1991	Extensive use in pharmaceuticals. 5th most prescribed drug in U.S. Significant human exposure. Human and animal metabolism appear to be similar. Lack of adequate carcinogenesis data.	No testing - prednisone would be difficult to test because of extraneous hormonal effects; when used as an anti-inflammatory agent, exposure period is short and administered doses are low. - Carcinogenicity Intraperitoneal Injection special report published in literature (Weisburger (1977) Bioassay Program for Carcinogenic Hazards of Cancer Chemotherapeutic Agents. Cancer 40: 1935-1949) - Positive in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Premarin 12126-59-9	Private Individual 1991	Epidemiological evidence for carcinogenicity inconclusive, increased use in post-menopausal women over 50.	no testing
Prilocaine 721-50-6	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Procaine 59-46-1	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Propargyl alcohol 107-19-7	NCI 1996	Propargyl alcohol is nominated for subchronic studies based on potential for human exposure and a suspicion of carcinogenicity. Propargyl alcohol is a high production volume chemical, which is used mainly as a chemical intermediate for a variety of products. It has been identified in air, soil and solid waste. The suspicion of carcinogenicity is based on its metabolism to the aldehyde and positive results in genotoxicity studies. The hepatotoxicity observed in previous studies is similar to that produced by carbon tetrachloride. Chronic toxicity data is lacking.	Selected toxicity and carcinogenicity testing recommended
Propoxycaine 550-83-4	Private Individual 1994	See Local anesthetic compounds	See Local anesthetic compounds
Propyl alcohol 71-23-8	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Propylene glycol dinitrate 6423-43-4	Private Individual 1991	Past and current human exposure; potential for human health risks; suspect agent for neurotoxicity observed in employees of an incineration plant	Deferred pending EPA testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Propylene glycol mono *tert*-butyl ether 57018-52-7	CPSC 1988	- Potential for increased use - Potential substitute for some ethylene glycol based ethers, which are known teratogens - Potential for widespread exposure at high levels - Lack of adequate toxicity data	- Subchronic inhalation completed - Inhalation carcinogenicity planned - Chemical disposition completed - Negative for CA and SCE in CHO cells - Positive in *Salmonella*
Pulegone 89-82-7	NIEHS 1998	The nomination of pulegone and menthofuran for testing is based on the potential for human exposure and the absence of carcinogenicity data. Pulegone is a major constituent of pennyroyal and menthofuran is one of the metabolites of pulegone.	Selected toxicity and carcinogenicity testing recommended
Pyridostigmine bromide 101-26-8	NCI 1995	There is significant human exposure to pyridostigmine bromide (PB) based on the reported use by 400,000 soldiers in the Gulf War as a pretreatment for exposure to nerve agents. There is concern about possible link of PB to the unexplained illness of Gulf War veterans. The studies of synergistic effects in animals would provide guidelines as to kinds of adverse effects that might be observed in humans exposed to PB in conjunction with other chemicals.	No testing - carcinogenicity testing of pyridostigmine bromide alone is not warranted but should be in combination studies with other Gulf War chemicals. Although the NTP would be willing to contribute in whatever way is needed, until it is clarified exactly what the Gulf War Syndrome entails and which compounds that people were exposed to may have caused it, a straightforward nomination for testing PB and other chemicals cannot be made. In addition, NTP resources should not be used for studies that are already being supported by the Army. No testing was recommended unless the Army contacts the NTP. NTP Executive Committee recommended deferral until results of the DOD study are available. - Negative in *Salmonella*
Pyrogallol 87-66-1	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Quinoxaline 91-19-0	NCI 1996	Quinoxaline is nominated for metabolism studies based on its potential for human exposure and a suspicion of carcinogenicity based on its structural relationship to quinoline. It has a wide variety of chemical uses and has been identified as a natural flavor constituent of coffee and roasted sesame seed oil.	No further testing based on little human and environmental exposure
Ralumac	Private Individual 1995	Ralumac a relatively new product on the market for roadway microsurfacing.	No testing - the Material Safety Data Sheet states that the product is said to be carcinogenic because it contains asphalt.
Reevaluation of early NTP studies Dichlorodiphenyl trichloroethane (DDT) (50-29-3) Chloroform (67-66-3) Dieldrin (60-57-1) Chlordane (Technical Grade) (12789-03-6) Carbon tetrachloride (56-23-5) Chlordane (Analytical Grade) (57-74-9) Aldrin (309-00-2)	Private Individual 1991	A number of early NTP studies showed carcinogenic responses in livers of mice, but not in rats. In those studies in Osborne-Mendel rats, control groups generally consisted of only 20 animals, and the duration of exposure was 78 weeks. Most of these compounds have been shown to cause increases in hepatocyte DNA synthesis. Better designed studies are warranted.	Withdrawn by nominator
Retroviral Vectors	NIEHS 1991	To study the long-term effects of experimental treatment of immune deficiency disorders	- Intraperitoneal injection repeated dose completed - Whole body exposure repeated dose completed - Intravenous injection repeated dose completed

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Rosin 8050-09-7	NCI 1989	- High production volume - Used in a variety of consumer products - Potential for significant human exposure - Carcinogenic potential is unknown	- Nominated for carcinogenicity; under review
Saw Palmetto Extract 84604-15-9	Private Individual 1997	Saw palmetto is an herbal dietary supplement being widely promoted as a prostate hypertrophy preventative agent, and as a therapy for this condition. Some clinical data show beneficial effects greater than those from prescription medications, with very good tolerance. The use of saw palmetto continues to grow based on favorable press stories. It is not known whether long term or carcinogenicity testing has been performed in animals; no data were found.	Withdrawn
Sesamol 533-31-3	NCI 1989	- Potential for human exposure to sesamol as a common constituent of sesame oil - Lack of adequate toxicity data	- CEC and BSC recommended no testing because the chemical is a minor component of a naturally occurring product and has no commercial production or use.
Biogenic silica fibers formed from the burning of sugar cane leaves and trash	Private Individual 1988	- Potential for widespread environmental contamination - Respirable size silica fibers identified in smoke from sugar cane burning - Reports of toxic effects associated with sugar cane farming (e.g., mesothelioma, leukemia)	- Deferred pending response from nomination source regarding definition of a representative test sample. Will be considered with study of fibers.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Silicones (Class Study)	Private Individual 1994	Nomination of Silicones as a class. The testing performed in the 1960's and 1970's is substandard and does not specifically address questions of immunotoxicity. Silicones have widespread use in both commercial and medical settings.	No testing by NTP at the present time. EPA & FDA have invoked TSCA and are in the evaluation process for studies received. NTP will coordinate with FDA & EPA. If test data that FDA requires is not obtainable through this process, the NTP has the option of initiating the needed tests. In the interim it would be more appropriate for the "silicone industry" to perform the needed testing.
Silver nitrate 7761-88-8	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
Simazine 122-34-9	NIEHS 1992	See Acetochlor	See Acetochlor
beta-Sitosterol 83-46-5	Private Individual 1997	Saw palmetto is an herbal dietary supplement being widely promoted as a prostate hypertrophy preventative agent, and as a therapy for this condition. Some clinical data show beneficial effects greater than those from prescription medications, with very good tolerance. The use of saw palmetto continues to grow based on favorable press stories. It is not known whether long term or carcinogenicity testing has been performed in animals; no data were found.	Withdrawn
Sodium acetate 127-09-3	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers
Sodium borate 1303-96-4	Private Individual 1991	See Photographic Fixers & Developers	See Photographic Fixers & Developers

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Sodium bromate 7789-38-0	EPA 1997	The EPA is in the process of developing new drinking water regulations for water disinfection by-products (DBPs). The agency is prioritizing testing in the chronic bioassay for those DBPs of relatively high occurrence, and those that it believes may pose the greatest risk to human beings. The EPA plans to develop a chronic database on several DBPs, representing different chemical classes (eg, trihalomethanes, haloacetic acids, haloacetonitriles). The EPA is also requesting that the DBPs be evaluated in chronic mouse transgenic studies as well as the standard 2-year cancer bioassay.	Selected for testing under the Water Disinfection Model Evaluation initiative by the dermal and drinking water route. - Continuous Breeding - selected - Repro/Dev Gen Tox (28-Day) (Screen): positive (male); negative (female) - Immunotoxicity (immunosuppression) - report in preparation
Sodium chlorate 7775-09-9	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)
Sodium metasilicate 6834-92-0	NIOSH 1998	Sodium metasilicate was nominated for subchronic inhalation testing due to the high number of workers exposed, the indications that it is biologically active, and existing gaps in data. Due to the evidence of contact urticaria following dermal exposure, it is also recommended that hypersensitivity testing be conducted using both dermal and inhalation routes of exposure.	In review
Sodium thioglycolate 367-51-1	NCI 1996	Sodium thioglycolate is nominated for reproductive studies based on widespread worker and consumer exposure. It is used mainly in cosmetic products, permanent wave and hair straightening products and exposure is mainly to the female population.	Selected for reproductive toxicity testing via topical exposure - Negative in *Salmonella* - Teratology, selected - Teratology pilot, selected

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
alpha-Solanine 20562-02-1	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Spirits (Alcoholic Beverages)	Private Individual 1992	Lack of studies on alcoholic beverages, wide consumer exposure	No testing - NTP currently testing ethanol and urethane
Stoddard Solvent 8052-41-3	United Auto Workers 1994	See Organic Solvents	See Organic Solvents
Stoddard Solvent (Type IIC) 64742-88-7	United Auto Workers 1994	See Organic Solvents	See Organic Solvents
Styrene 100-42-5	Private Individual 1991	None given by nominator	No further testing at this time - industry is performing chronic studies - Carcinogenicity gavage technical report published (TR-185 reports NE, MR FR FM; EE, MM) - Prechronic inhalation completed - Mechanisms completed - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative in *Salmonella* in two independent tests

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Styrene oxide 96-09-3	State of California EPA (OEHHA) 1995	A component in facility chemical emissions lacking acute exposure data.	No further testing - lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. Do not have resources to test by acute inhalation. - Carcinogenicity study by gavage reported in literature (W. Lijinsky. 1986. Rat and Mouse Forestomach Tumors Induced by Chronic Oral Administration of Styrene Oxide. J. Nat Cancer Inst. 77, No. 2:471-476) - Chemical disposition completed - Teratology completed - Positive in mouse lymphoma - Positive in *Salmonella*
Sulfuric acid 7664-93-9	Private Individual 1998	The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels. There is no sulfuric acid mist animal test data, which would permit evaluation of exposure response characteristics or impact of mixed exposures.	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Sulfuric Acid Mist	United Auto Workers 1994	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, acute and subacute testing in animals, or inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels.	Sulfuric acid (7664-93-9): No testing -- IARC has determined that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans (Group 1). There are no rodent carcinogenicity data available. Because of the problems associated with chronically exposing animals to sulfuric acid mist and IARC's classification, the NTP has decided not to test this substance in animals.
Symphytine 22571-95-5	NIEHS 1998	The nomination of comfrey and symphytine by the NIEHS for testing is based on the potential for chronic human exposure and the limited amount of carcinogenicity data.	Selected

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Synthetic Fragrances	Private Individual 1996	There are increasing complaints of perfumes and synthetic fragrances having an adverse effect on health. Many people have developed sensitivities to chemicals used in fragrances.	In review. NTP has requested information from the Consumer Product Safety Commission (CPSC) on adverse health effects & testing strategies for fragrances or for substances that create symptoms described by fragrance-sensitive people. 1,8-Cineol (470-82-6): - Dosed-feed, completed prechronic - Gavage, completed prechronic - Negative for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Negative in *Salmonella*
Synthetic Mineral Fibers	United Auto Workers 1994 Private Individual 1998	Chemicals used with substantial exposure in the transportation equipment and related metalworking industries. For most of these chemicals there is evidence for human health risks, particularly occupational cancer and respiratory toxicity found in epidemiological studies, from case reports, acute and subacute testing animals, or inadequate chronic exposure studies. For some, confirmation in well conducted chronic laboratory studies is needed; for others, a more elaborate and coordinated approach involving short term tests, uptake, and distribution studies are needed. The goal is to complete the data set for more reliable extrapolation from data regarding hazards from short term, high exposure or both, to prevailing exposure levels. The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	Carbon/graphite fiber composites: consider as part of NIOSH/NIEHS toxicity evaluation of complex industrial exposures In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Synthetic Polymer Process Emissions	United Auto Workers 1994		Methyl ethyl ketone peroxide (1338-23-4): - Topical toxicity technical report published (TOX-18) - Positive for chromosomal aberration and sister chromatid exchanges in Chinese hamster ovary cells - Positive in mouse lymphoma - Negative in micronucleus assay - Negative in *Salmonella* and positive in another *Salmonella* test No additional testing - the NTP performed subchronic dermal studies of MEKP. The chemical was corrosive at the site of application. Additional studies with MEKP would be limited by its corrosivity, and therefore, no chronic carcinogenicity studies are planned. Formaldehyde (50-00-0): - Prechronic inhalation completed - Teratology completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Synthetic Polymer Process Emissions (continued)			- Positive for sex-linked recessive lethal mutations and negative for reciprocal translocation in *Drosophila* in two independent tests - Positive for sex-linked recessive lethal mutations and reciprocal translocation in *Drosophila* in two independent tests - Negative for sex-linked recessive lethal reciprocal translocation in *Drosophila* - Positive in *Salmonella* in six independent tests; weakly positive in *Salmonella* in two tests. Forwarded to NIOSH to request assistance in evaluating nomination from the standpoint of occupational exposure 1,6-Hexanediamine dihydrochloride (6055-52-3): - Inhalation and dosed-water subchronic toxicity report (TOX-24) - Negative in micronucleus assay (male & female) Prechronic studies done by dosed water and inhalation indicated only signs of irritation. Decision made to not pursue chronic study. Triethylamine (121-44-8): No testing - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Synthetic Polymer Process Emissions (continued)			Phenol-formaldehyde resin dust (9003-35-4) In review NIOSH/NIEHS toxicity evaluation of complex industrial exposures Di-2-ethylhexanol (68915-36-6) In review Thermoplastic pyrolysis products (thermoplastic) NIOSH/NIEHS toxicity evaluation of complex industrial exposures Epoxy-polyurethane catalysts (EPOXYPOLYCAT) In review Paint dust: No testing planned -- because of the diverse nature of this category of substance, and because any sample selected for testing would be representative of only a limited class of potential samples. Polyester-polystyrene dust [in combination with fibrous glass]: NIOSH/NIEHS toxicity evaluation of complex industrial exposures

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Synthetic Polymer Process Emissions (continued)			Paint mist solids: No testing planned -- because of the diverse nature of this category of substance, and because any sample selected for testing would be representative of only a limited class of potential samples Dimethylethylamine (598-56-1) In review
Talc 14807-96-6	United Auto Workers 1994 Private Individual 1998	See Mineral Particulate The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Mineral Particulate In review Carcinogenicity study via inhalation in rats and mice completed [TR-421 reports (male rats) some evidence; (female rats) clear evidence; male mice (no evidence); female mice (no evidence) (1993)]
Tamoxifen	Private Individual 1992	Evidence that tamoxifen may induce or promote the development of aggressive hormone independent tumors; increase the risk of life-threatening liver cancer; increase the risk of endometrial cancer, necessitating hysterectomy as "cure"; increase the relative risk of developing contralateral breast cancer in premenopausal women; and act as a teratogen on the developing human genital tract.	Tamoxifen citrate (54965-24-1) - Chemical disposition completed - Toxicokinetics completed - Continuous breeding completed
TCDD 1746-01-6	NIEHS/EPA 1995	See Dioxin Toxic Equivalence Factor Studies	See Dioxin Toxic Equivalence Factor Studies

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2,2'4,4'-Tetrabromodiphenyl ether 5436-43-1	Private Individual 1998	Polybrominated diphenyl ethers were nominated based on their bioaccumulative properties, the ongoing production of PBDEs, and the possibility for widespread human exposure through the food chain. There is a lack of subchronic and chronic toxicity information and a suspicion of neuro-developmental toxicity. Studies in rodents have shown hyperplasia of the thyroid and a decrease in circulating thyroid hormone levels after exposure to technical mixtures of PBDEs.	In review
1,1,1,2-Tetrabromoethane 630-16-0	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
1,1,2,2-Tetrabromoethane 79-27-6	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
Tetrabromophthalic anhydride 632-79-1	NIEHS 1995	See Brominated chemicals	See Brominated chemicals
3,3′4,4′-Tetrachloroazobenzene 14047-09-7	EPA 1988	- Potential for worker and consumer exposure - Contaminants of several herbicides derived from dichlorophenol - Potential for persistence and accumulation on food crops - Isosteric with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); binds to same receptor site as TCDD in liver	- Prechronic gavage report - In review - Selected for testing as example of a dioxin-like compound - Chemical disposition completed - Metabolism, completed - Positive in *Salmonella* - Positive male/negative female Micronucleus

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
3,3′,4,4′-Tetrachloroazoxybenzene (TCAB) (21232-47-3) And 3,3′,4,4′-Tetrachloroazobenzene (TCAOB) (14047-09-7) In Drinking Water	EPA 1988 EPA 1991	- Potential for worker and consumer exposure - Contaminants of several herbicides derived from dichlorophenol - Potential for persistence and accumulation on food crops Isosteric with 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD); binds to same receptor site as TCDD in liver Potential for human exposure; TCAB and TCAOB are contaminants of 3,4-dichloroaniline (DCA) and herbicides synthesized from DCA; TCAB & TCAOB are microbial transformation products of several 3,4-dichloroacrylanilide herbicides such as diuron, linuron, and propanil, which are still registered and commercially available. EPA Office of Drinking Water is concerned about exposures to TCAB and TCAOB in drinking water which is contaminated by these products. EPA ODW will use NTP data to determine need for regulation and, if necessary, to set appropriate regulatory levels.	- Prechronic gavage completed - Chemical disposition completed - Negative in *Salmonella* - Positive male/negative female Micronucleus TCAB: - Prechronic gavage - In review - Chemical disposition completed - Positive in micronucleus assay - Negative in another micronucleus assay - Negative in *Salmonella* TCAOB: - Prechronic gavage - In review - Prechronic gavage selected - Chemical disposition completed - Metabolism completed - Positive in one micronucleus assay and negative in another - Positive in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin 1746-01-6	Private Individual 1991	Compelling evidence that ovarian hormones, probably estrogens, are required for hepatocarcinogenic actions of TCDD. Moreover, TCDD does not induce cell proliferation in the absence of estrogens. Since TCDD is considered the prototypical non-genotoxic carcinogen, it is an excellent candidate to study the relationship between cell proliferation and cancer.	Consider with studies of Dioxin Toxic Equivalence Factor studies. - Carcinogenicity gavage technical report published (TR-209 reports CE, MR FR MM FM) - Carcinogenicity topical technical report published (TR-201 reports CE, FM; EE, MM) - Chemical disposition completed - Mechanisms completed - Toxicokinetics completed - Immunotoxicity completed - Teratology pilot study completed - Negative for chromosome aberrations - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* - Negative in mouse lymphoma - Negative in *Salmonella* - Negative for sister chromatid exchanges
1,1,1,2-Tetrachloroethane 630-20-6	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
1,1,2,2-Tetrachloroethane 79-34-5	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
2,3,5,6-Tetrachloropyridine 2402-79-1	NIEHS 1997	High production & inadequate or no tox studies. (Zeiger)	In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Tetralin/Decalin	NCI 1993	Tetralin and decalin are products of the hydrogenation of napththalene. Both compounds are available commercially and were nominated because of the high potential for consumer exposure through their use as solvents in paints, waxes and polishes. Both compounds also occur naturally. There is also a potential for contamination of drinking water supplies. Decalin is released into the environment from the burning of coal tar and other fossil fuels	Decalin (91-17-8) - Subchronic inhalation completed - Chronic inhalation on test - Short-term *in vivo* teratology completed - Negative in *Salmonella* Tetralin (119-64-2) - Inhalation subchronic completed - Chronic inhalation on test - Negative in *Salmonella*
Theobromine 83-67-0	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Thermoplastic Pyrolysis Products	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Tobacco-Specific N-Nitrosamines	American Health Foundation 1994	Based on our present knowledge environmental tobacco smoke contains only one group of carcinogens which are tobacco-specific. This group of carcinogens contains the tobacco-specific N-nitrosamines (TSNA). It is time for an official government bioassay on TSNAs. The first TSNA to be studied should be NNK, which induces lung tumors independent of route or site of application as an organ-specific carcinogen. Based on biochemical molecular biological data NNK is suspected to induce also lung adenocarcinoma in men, the type of lung tumor not only seen in active smokers, but also in passive smokers.	4-(*N*-Nitroso-*N*-methylamino)-1-(3-pyridyl)-1-butanone (64091-91-4): In review - Special study completed - Negative in micronucleus assay
Topoisomerase II Inhibitors	Private Individual 1995	When topoisomerase II (TOPO II) enzymes were initially recognized as targets for chemicals it appeared that these were isolated examples restricted to anticancer drugs. However, it is increasingly becoming recognized that other types of chemicals have TOPO II targets -- including drugs used to treat urinary infections, environmental agents and food components, as well as some pesticides. Recent data make it clear that they are potent carcinogens causing cancers with characteristic cytogenetic modifications and short latent periods. Extensive study needed.	No specific agents identified by nominator. In review
Tremolite (Non-Asbestiform) 14567-73-8	CPSC 1988	- Used in playsand - Potential for human exposure, especially children - Congressional and public interest in the safety of playsand - Lack of adequate chronic toxicity data	Originally selected for carcinogenicity testing. No testing based on inability to obtain representative test material.

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Triamcinolones Class Study	NCI	- Extensive use in pharmaceuticals over an extended period of time - Significant human exposure - Lack of adequate carcinogenicity data	Nominated for carcinogenicity. NCI recommended triamcinolone acetonide as the most suitable chemical to test in order to obtain information on the carcinogenicity potential of triamcinolone and its derivatives.
Tribromoacetic acid 75-96-7	EPA (Office of Water) 1995	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)
Tribromophenol 118-79-6	NIEHS 1995	See Brominated chemicals	See Brominated chemicals
Tribromosalan 87-10-5	NIEHS 1995	See Brominated chemicals	See Brominated chemicals
Trichlorfon 52-68-6	NIEHS 1994	See Pesticides and Kids	See Pesticides and Kids
1,1,1-Trichloro-2,2,2-trifluoroethane 354-58-5	NIEHS 1991	See Halogenated Ethanes Class Study	See Halogenated Ethanes Class Study
Trichloroacetic acid 76-03-9	EPA 1988 EPA (Office of Water) 1995	- Breakdown product of drinking water disinfectants - High human exposure Suspicion of carcinogenicity See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	- Deferred in order to provide EPA (the nomination source) with the available toxicity data and to ascertain whether EPA requires more test data See Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
1,1,1-Trichloroethane 71-55-6	NIEHS 1991 United Auto Workers 1994 Private Individual 1998	See Halogenated Ethanes Class Study See Organic Solvents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Halogenated Ethanes Class Study See Organic Solvents In review Carcinogenicity gavage technical report published [TR-003 reports inadequate study in male and female rats and mice (1977)] - Short-term subchronic gavage studies completed in rats and mice - Short-term studies via microencapsulation in feed completed - Report in review - Chemical Disposition completed - Mechanisms completed - *In vitro* cytogenetics: positive (chromosome aberrations); inconclusive (sister chromatid exchanges) - Mouse lymphoma: inconclusive; negative - Micronucleus: equivocal (male); negative (female) - Negative in *Salmonella* - Conventional Teratology completed (dosed water; gavage)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Trichloroethylene 79-01-6	United Auto Workers 1994 Private Individual 1998	See Organic Solvents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Organic Solvents In review - Carcinogenicity gavage technical report published 1976 (TR-002 reports negative in male and female rats; positive in male and female mice) - Carcinogenicity gavage technical report published 1988 (TR-273 reports inadequate studies in four strains of rats) - Carcinogenicity gavage technical report published 1990 (TR-243 reports inadequate study in male rats; no evidence in female rats; positive in male and female mice) - Prechronic studies via feed and gavage completed - Chemical disposition (ip/ij; water) completed - Immunotoxicity completed - Continuous Breeding completed - Chromosome Aberrations: negative - *In Vitro* Cytogenetics : Negative (Chromosome Aberrations); Positive (Sister Chromatid Exchanges) - *Drosophila* (Sex-Linked Recessive Lethal/Reciprocal Translocation): Inconclusive - Mouse Lymphoma: Positive - Micronucleus: Negative - *Salmonella:* Negative - Sister Chromatid Exchanges: Negative (Nonstandard Protocol)

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
2,4,5-Trichlorophenoxyacetic acid 93-76-5	Private Individual 1992	Widespread human exposure based on past use as herbicide; evidence of association between exposure and non-Hodgkin's lymphoma.	In review - Immunotoxicity completed - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Negative for sex-linked recessive lethal mutations in *Drosophila* - Negative in *Salmonella*
Triethanolamine 102-71-6	United Auto Workers 1994 Private Individual 1998	See Machining Fluid Constituents The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Machining Fluid Constituents In review - Carcinogenicity topical technical report reported 10/98 (TR-449 reports equivocal evidence for male and female rats; inadequate study in mice) - Chronic topical study on test in mice - Immunotoxicity completed - Teratology completed - Chemical Disposition completed - *In vitro* Cytogenetics: Negative (Chromosome Aberrations); Negative (Sister Chromatid Exchanges) - *Drosophila* (Sex-Linked Recessive Lethal/Reciprocal Translocation): Negative - Micronucleus: Negative (Male); Negative (Female) - *Salmonella*: Negative
Triethylamine 121-44-8	United Auto Workers 1994 Private Individual 1998	See Synthetic Polymer Process Emissions The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Synthetic Polymer Process Emissions In review - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
1,3,5-Triglycidyl isocyanurate 2451-62-9	NCI 1993	Nomination based on current level of use, predicted growth, and indications of potential exposures. Triglycidyl isocyanurate is principally used as a monomer in polyester-epoxy resin coating material. In terms of structure/activity, toxicity data available for related compounds show that the compound may be carcinogenic.	Deferred - EPA is currently reviewing health effects studies of the chemical submitted under TSCA 8E. Deferred pending EPA's risk management assessment of the chemical. - Positive for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells; - Positive in *Salmonella*
Trigonelline 535-83-1	Private Individuals 1996	See Naturally Occurring Chemicals in the Diet	See Naturally Occurring Chemicals in the Diet
Trimethoprim/Sulfamethoxazole (Commercial) (8064-90-2)	NCI 1992	Significant human exposure as extensively used drug for treatment of urinary tract infections and pneumonia caused by *P. carinii* (PCP) and its potential use in AIDS patients with PCP.	- Selected for carcinogenicity/toxicity study; testing deferred pending results of industry testing - Positive in micronucleus assay
Vinclozolin 50471-44-8	NIEHS 1996	See Endocrine Disrupter Project	See Endocrine Disrupter Project
5-Vinylnorbornene 3048-64-4	NIEHS 1997	5-Vinylnorbornene was selected by the NIEHS for testing based on the lack of data on chemical disposition, metabolism, toxicokinetics, reproduction, development, carcinogenicity, and immunotoxocity.	In review
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs)	American Water Works Association Research Federation 1991 EPA (Office of Water) 1995	Investigation into health effects of water disinfection by-products for possible future regulation; lack of carcinogenicity information on important water disinfection by-products. Wide human exposure The process of water purification can produce unwanted contaminant by-products. There is widespread exposure to treated drinking water, yet there is limited toxicity study data upon which to base human risk.	Chloral (75-87-6): - Positive In *Salmonella* No Further Testing Recommended Bromochloroacetonitrile (83463-62-1): No Testing

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) (continued)			Dibromoacetonitrile (3252-43-5): - Selected as a water disinfection by-product for carcinogenicity testing - Reproductive, Developmental and General Toxicity completed - Report In review; - Negative for sex-linked recessive lethal mutations in *Drosophila*; - Weakly positive in *Salmonella* in three independent tests and inconclusive in another test Dichloroacetonitrile (3018-12-0): - Weakly positive for chromosomal aberrations and positive for sister chromatid exchanges in Chinese hamster ovary cells - Positive for sex-linked recessive lethal mutations in *Drosophila* and negative for reciprocal translocation in *Drosophila* - Positive in *Salmonella* Bromodichloroacetic acid (71133-14-7): - Selected as a water disinfection by-product for carcinogenicity testing Bromoacetic acid (79-08-3): - Positive in *Salmonella* 3-Chloro-4-(dichloromethyl)-5-hydroxy-2(5H)-furanone(MX) (77439-76-0): - Selected for toxicity/carcinogenicity study - Toxicokinetic study on test - Selected for chemical disposition study

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) (continued)			Dibromoacetic acid (631-64-1): - Selected as a water disinfection by-product for carcinogenicity testing - Selected for toxicokinetics study - Spermiation inhibition study completed - Immunotoxicity study completed Bromodichloromethane (75-27-4): -Water disinfection byproduct repeated dose dosed-water completed - Transgenic model evaluation carcinogenicity/toxicity assigned - Water disinfection model carcinogenicity/toxicity assigned - Gavage, technical report published (TR-321 Reports CE, MR FR MM FM) - Chemical disposition completed - Toxicokinetic study, selected - Reproductive/developmental general - Tox (28 Day) completed - Negative for chromosomal aberrations and inconclusive for sister chromatid exchanges in Chinese hamster ovary cells - Positive in mouse lymphoma - Negative in Micronucleus Assay - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) (continued)			Glyoxal (107-22-2): Under consideration; reported to be formed by ozonation disinfection of water containing humic material. [NTP-Conducted Palatability Studies Determined Glyoxal Dihydrate; not palatable in feed. 90-Day Drinking Water Study completed but study was stopped prior to chronic duration due to instability of chemical in drinking water.] - Dosed-water subchronic completed - Positive in *Salmonella* Dichloroacetic acid (79-43-6): Deferred to ascertain whether EPA requires additional toxicity studies. - Spermination inhibition - Report in preparation - Positive in *Salmonella* Trichloroacetic acid (76-03-9): Deferred to ascertain whether EPA requires additional toxicity studies. - Negative in *Salmonella* Bromodichloroacetic acid (71133-14-7): Selected For water disinfection by-product carcinogenicity/toxicity testing Bromoacetic acid (79-08-3) In review - Positive In *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) (continued)			3-Chloro-4-(dichloromethyl)-5-hydroxy-2(5H)-furanone (MX) (77439-76-0): - Water disinfection by-products dosed water carcinogenicity/toxicity assigned; - Chemical disposition selected; - Toxicokinetic study on test Dibromoacetic acid (631-64-1): - Water disinfection by-products dosed water carcinogenicity/toxicity on test - Toxicokinetic Study, selected - Spermiation Inhibition report in preparation - Immunotoxicity completed Methyl glyoxal (78-98-8): In review Chlorate (Chlorate Ion) (14866-68-3): [See Water Disinfection Byproducts (Sodium Chlorate)] Cyanogen chloride (506-77-4): - Selected for Toxicity/Carcinogenicity - Negative in *Salmonella*

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Water Disinfection By-Products- Halogenated Acetic Acids (HAAs) (continued)			Bromochloroacetic acid (5589-96-8): - Selected for water disinfection byproduct carcinogenicity/toxicity testing - Selected for total reproductive capacity testing - Reproductive/Developmental General Tox (28 day), completed - Positive in *Salmonella* Water Disinfection By-Products (Sodium chlorate) (7775-09-9): (Sodium chlorate was selected as the source of the chlorate ion for testing.) - Water Disinfection By-Product chronic dosed-water on Test - Selected for toxicokinetic study - Teratology completed
Waxes used on fruits and vegetables	Private Individual 1994	Waxes used on fruits and vegetables should be tested for human toxicity.	No testing - these chemicals are regulated by FDA. NTP has requested a list of approved waxes used on fruits and vegetables, and some indication of whether their use is supported by toxicology data.
Welding Fume (Copper, Zinc, Lead Oxide)	United Auto Workers 1994 Private Individual 1998	See Metals The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Metals In review

Chemical Name/ CAS Number	Nomination Source/Year	Rationale for Request	Current NTP Status[1,2]
Wood Dust	United Auto Workers 1994 Private Individual 1998	See Organic Particulate The nominator is concerned about chemicals and combinations of chemicals found in the industrial environment in substantial levels.	See Organic Particulate In review
Xylenes	State of California EPA (OEHHA) 1995	There are data gaps that should be filled in order to set scientifically based acute and chronic non-cancer reference exposure levels for use in human and environmental risk assessments. We have found that the lack of quality acute inhalation data occurs with alarming frequency even with many commonly used chemicals.	No additional testing by NTP. NTP does not perform human clinical or exposure studies. Lack of funding to conduct a repeat study or to fill data gaps when carcinogenicity and other study data are already available. No resources to test by acute inhalation. Xylenes (Mixed) (1330-20-7): - Gavage, technical report published (TR-327 reports NE, MR FR MM FM) - Teratology, completed - Negative for chromosomal aberrations and sister chromatid exchanges in Chinese hamster ovary cells - Positive in mouse lymphoma - Negative in *Salmonella* *o*-Xylene (95-47-6): - Negative in *Salmonella* *p*-Xylene (106-42-3): - Negative in *Salmonella* *m*-Xylene (108-38-3): - Negative in *Salmonella*

[1]This table contains updated information through 1998. For additional information about NTP studies listed in this table contact Central Data Management, Mail Drop E1-02, NIEHS. P.O. Box 12233, Research Triangle Park, NC 27709 (Phone: 919-541-3419; Fax: 919-541-3687; e-mail: CDM@niehs.nih.gov). The

abstracts for all published NTP long-term carcinogenicity technical reports and short-term toxicity study reports are available electronically over the Internet. To view all abstracts and additional NTP information, use the URL http://ntp-server.niehs.nih.gov/.

[2]CE = clear evidence of carcinogenic activity; SE = some evidence of carcinogenic activity; EE = equivocal evidence of carcinogenic activity; NE = no evidence of carcinogenic activity; IS = inadequate study of carcinogenic activity; MR = male rats; FR = female rats; MM = male mice; and FM = female mice